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Agency Review Draft

Operable Unit 1 Human Health Risk Assessment: Ventron/Velsicol Site Wood-Ridge/Carlstadt, New Jersey

Prepared for

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Acronyms and Abbreviations

CDI	chronic daily intake
CoPC	chemical of potential concern
CSF	cancer slope factor
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
HHRA	human health risk assessment
IRIS	Integrated Risk Information System
NCEA	National Center for Environmental Assessment
NCP	National Contingency Plan
NJDEP	New Jersey Department of Environmental Protection
OU1	Operable Unit 1
OU2	Operable Unit 2
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PRG	preliminary remediation goal
RAGS	Risk Assessment Guidance for Superfund
RBC	risk-based concentration
Resolution	Resolution of the Berry's Creek/Wood-Ridge Site Action Committee
RfD	reference dose
RI/FS	remedial investigation and feasibility study
RME	reasonable maximum exposure
Stipulation	Stipulation and Supplementary Order Approving Cooperative Agreement for Remedial Investigation and Feasibility Study and Amending Procedural Order Involving Remedy
the site	Ventron/Velsicol site
UCL	upper confidence limit

Executive Summary

On behalf of Rohm and Haas Company, Exponent has prepared a human health risk assessment (HHRA) for the Ventron/Velsicol site (the site) located in Wood-Ridge and Carlstadt, New Jersey. The objective of the baseline HHRA is to quantify human health risks associated with chemicals of potential concern (CoPCs) in the absence of any remedial action (i.e., under the no-action alternative). This document constitutes Section 6 of the remedial investigation report for Operable Unit 1 (OU1) of the site (Exponent 2000) and relies on data collected during that investigation. This version of the HHRA updates the draft that was submitted in April 2001 and reflects comments and responses to comments subsequent to that submittal (NJDEP 2001, 2003; NJDEP and U.S. EPA 2002; Exponent 2001b, 2002).

The site is located in Bergen County, New Jersey, within the boroughs of Wood-Ridge and Carlstadt. In accordance with the New Jersey Department of Environmental Protection (NJDEP), the site has been divided into two operable units: OU1 and OU2; only OU1 is addressed here. The two operable units together make up an irregularly shaped, approximately 38-acre parcel within an industrialized area of northeastern New Jersey. The site is designated as a National Priorities List site identified by U.S. Environmental Protection Agency (EPA) number NJD980529879, and bearing CERCLIS ID number 02C7.

Chemicals of Potential Concern

The HHRA used a conservative screening process to select CoPCs, to ensure that any chemicals that could be of concern were fully evaluated. All available chemical concentration data were reviewed for soil, groundwater, air, and sediments and water in OU1 ditches (i.e., onsite basin, West Ditch, and Diamond Shamrock/Henkel Ditch [north]). In addition, data identified as hazardous waste samples were included in the HHRA as requested by NJDEP. Site concentration data were compared with conservative risk-based concentrations derived by EPA Region IX. A total of 41 CoPCs (or groups of CoPCs) were identified for further analysis in the

HHRA, including one or more CoPCs identified in each of the media evaluated. Mercury was identified as a CoPC in all site media.

Exposure Assessment

The OU1 site under consideration includes a developed area, which is currently under commercial use, and an undeveloped area that would likely require fill in order to be developed. The Borough of Wood-Ridge has zoned the site area as "light industrial park" (Kolicko 1997, pers. comm.) and thus, future residential use is considered unlikely. Given the site characteristics, current use, and zoning regarding future use, the most likely potential human receptors include onsite workers and trespassers who might visit the site. Onsite workers are likely to be the receptor population with the highest exposure potential. However, because all groundwaters in the State of New Jersey are considered potable, groundwater CoPCs are evaluated in a future hypothetical residential drinking water scenario. The HHRA quantitatively evaluated site media for the following exposure pathways:

- **Surface soils in the developed area**—Incidental ingestion, and dermal contact with CoPCs by long-term workers and construction workers
- **Surface soils in the undeveloped area**—Incidental ingestion, dermal contact with CoPCs by long-term workers, construction workers, and trespassers who might visit OU1
- **Subsurface soils in the developed and undeveloped areas**—Ingestion and dermal contact with CoPCs in subsurface soils by construction workers
- **Surface water and sediments in OU1**—Incidental ingestion and dermal contact with surface water and sediment by an adult or older child trespasser who might contact CoPCs in the onsite basin and the West Ditch
- **Groundwater**—Ingestion of and dermal contact with CoPCs in groundwater are evaluated in hypothetical OU1-wide future long-term worker and resident scenarios

- **Outdoor air**—Inhalation of mercury vapor in outdoor air by long-term workers in the developed or undeveloped area
- **Indoor air CoPCs migrating from subsurface soil or groundwater**—Inhalation of volatile contaminants in indoor air by long-term workers in the developed or undeveloped area
- **Indoor air CoPCs migrating from domestic groundwater**—Inhalation of volatile contaminants in indoor air during and after showering or bathing by residents who use groundwater for domestic drinking water.

~~Conservative~~ methods identified by EPA in risk assessment guidance documents were used to evaluate potential exposures. These scenarios are hypothetical. Some of the assumptions used in the risk assessment may have overestimated likely risks. In particular, use of OU1 groundwater as drinking water is highly unlikely, given the availability of other drinking water sources. Development of the undeveloped area for workplace use would require fill in many areas, so direct exposure to soil is not likely to occur. Trespassers entering the site are considered unlikely, given the site location and access restrictions, the current conditions, and anticipated future site use. In addition to consideration of hypothetical exposure pathways, conservative assumptions regarding exposure and toxicity were used to calculate potential risk estimates.

Toxicity Assessment

EPA toxicity values (i.e., cancer slope factors [CSFs] or reference doses [RfDs]) were identified for all CoPCs. Risk calculations were based on the current EPA toxicity values for all CoPCs. EPA extensively reviews and verifies RfDs and CSFs derived for risk assessment and, once verified and posted in Integrated Risk Information System, they represent agency consensus. Mercury and arsenic were responsible for the majority of site risks. Arsenic risk, however, is likely to be at least partly related to naturally occurring arsenic in soils. The EPA RfD for mercury was used as a basis for the risk assessment. However, given uncertainties in this

toxicity value, the uncertainty assessment provided alternative calculations based on the U.S. Agency for Toxic Substances and Disease Registry minimum risk level for mercury.

Risk Characterization and Conclusions

EPA toxicity values (i.e., CSFs or RfDs) were combined with exposure estimates to derive estimates of potential health risks related to exposure to CoPCs in media of OU1. Cancer risk estimates were compared to EPA's acceptable risk range of 1×10^{-6} to 1×10^{-4} established in the National Contingency Plan (NCP) for Superfund sites (U.S. EPA 1990b). The lifetime risk of developing cancer in the U.S. population is one in two (i.e., 5×10^{-1}) for men and one in three (i.e., 3×10^{-1}) for women (American Cancer Society 1998). A 1×10^{-6} excess cancer risk represents an additional one-in-one-million probability that an individual may develop cancer over a 70-year lifetime as a result of the exposure conditions evaluated. Noncancer effects are expressed as the ratio of the estimated exposure, or intake rate over a specified exposure period, to the RfD derived for a similar exposure period. This ratio is termed a hazard quotient. Exposures resulting in a hazard quotient less than or equal to 1 are unlikely to result in noncancerous adverse health effects.

Cancer Risk Estimates—Estimated total cancer risks for both reasonable maximum exposure (RME) and central tendency scenarios were within the 10^{-6} to 10^{-4} target risk range identified above, with one exception. The future hypothetical residential use of drinking water had a risk estimate of 2×10^{-4} (i.e., with ingestion, inhalation, and dermal contact combined). Specific results were as follows:

For the developed area:

- Under current conditions in the developed area, the long-term worker had a total risk estimate of 2×10^{-5}, resulting primarily from estimated concentrations of benzene in indoor air (from soil), and arsenic and polycyclic aromatic hydrocarbons (PAHs) in soil.

- Under hypothetical future conditions in the developed area, the long-term worker scenario had a total risk estimate of 7×10^{-5}, including the risk estimates identified above related to indoor air and soil exposures. The future worker also had assumed exposure to CoPCs through consumption of groundwater as drinking water, which had a risk estimate of 4×10^{-5}, primarily related to arsenic and benzene in water.

For the undeveloped area:

- Under hypothetical future conditions in the undeveloped area, the RME risk estimate for a long-term worker's ingestion of surface soil was 1×10^{-5}, and for dermal contact with soil was 1×10^{-5}, both related primarily to arsenic, PAHs, and polychlorinated biphenyls (PCBs). In addition, the risk estimate for consumption of groundwater was 4×10^{-5}, related primarily to arsenic and benzene in groundwater, for a total rounded risk estimate for long-term workers of 7×10^{-5}.

- The highest risk estimates for current or future trespassers to the undeveloped area were 2×10^{-5}, for ingestion of and dermal contact with soils. The highest total risk estimate for trespassers' exposure to sediments in the West Ditch or the onsite basin was 1×10^{-5}. Risks for the trespasser scenarios were also related primarily to arsenic, PAHs, and PCBs in soil and sediments.

- There were no carcinogenic CoPCs in surface water.

For the developed and undeveloped area:

- All risk estimates for the construction workers were below 1×10^{-6}, indicating that potential risks related to human contact with subsurface soils are well within acceptable levels identified by EPA.

Hypothetical residential use of groundwater

- The highest risk estimate for the hypothetical residential use of drinking water scenario was 2×10^{-4}, primarily related to arsenic in drinking water, with some contribution from benzene and 1,4-dichlorobenzene volatilized during showering or bathing.

Noncancer Risk Estimates—For noncarcinogens, in current scenarios, only current trespasser exposure scenarios in the undeveloped area had hazard indices greater than 1. These ranged from 1.3 to 3.5 and were primarily related to mercury in soil and sediment. In the future scenarios, the long-term worker, the adult and child trespasser scenarios, and the hypothetical residential use of groundwater all had hazard indices greater than the threshold of 1.

Results for the future scenarios for the long-term worker were as follows:

- The highest estimated hazard index was 3.8 for ingestion of surface soil in the developed area, based almost entirely on mercury in soil. If the single highest soil concentration of 13,800 mg/kg at SS-04 were to be applied as the exposure point concentration for surface soils in the developed area, the hazard index would be 22.5.
- Mercury in soil was also the primary contributor to a hazard index of 1.4 for long-term worker's exposure to surface soil in the undeveloped area.
- Future hypothetical workplace ingestion of groundwater site-wide had a hazard index of 2.0 based on iron, manganese, thallium, mercury, and arsenic.
- The total hazard indices for future long-term workers in the developed and undeveloped areas were 6.1 and 4.1, respectively, related to mercury in soils and mercury and other metals in water.

The future trespasser scenarios were assumed to be the same as the current scenarios described above, so the hazard indices are the same as those described for the current scenario.

Finally, the hypothetical residential use of drinking water scenario had total hazard indices of 12 for adults and 39 for children. In each scenario, approximately half of the total hazard index was related to ingestion of groundwater and half of the estimate was related to inhalation of volatile CoPCs during showering or bathing. The groundwater consumption estimates were related to iron, manganese, thallium, mercury, and arsenic, while the inhalation estimates were primarily related to naphthalene with some contribution from 4-methylphenol (evaluated as phenol), benzene, and xylenes.

Although the risk and hazard estimates for several hypothetical pathways exceeded the acceptable target range identified by EPA, these findings should be considered within the context of the uncertainties related to the estimation methods. Most fundamentally, the use of groundwater as drinking water is not a realistic site use, and many other assumptions regarding occupational or recreational use are likely to overestimate risks.

Mercury and arsenic were responsible for the majority of site risks. The potential for overestimation of OU1 risks related to exposure assumptions and to the toxicity value for mercury derived through application of a 1,000-fold uncertainty factor, suggests that risks may be lower than the RME estimates provided here. Furthermore, EPA indicates that the range of possible values around RfDs such as that used to evaluate inorganic mercury is "perhaps an order of magnitude." The hazard quotients estimated here for mercury in soil should be considered in this light.

In addition, although site-specific background concentrations were not available, concentrations of arsenic in OU1 soil were similar to those identified in background locations in suburban New Jersey. Thus, risks related to arsenic in OU1 soil would not be expected to differ substantially from estimates derived for typical background locations. Moreover, many of the potential exposure pathways considered here are entirely hypothetical. In particular, use of groundwater as drinking water is highly unlikely and is considered here only for risk assessment purposes.

1 Introduction

On behalf of Rohm and Haas Company, Exponent has prepared a human health risk assessment (HHRA) for the Ventron/Velsicol site (the site) located in Wood-Ridge and Carlstadt, New Jersey. The objective of the baseline HHRA is to quantify human health risks associated with chemicals of potential concern (CoPCs) in the absence of any remedial action (i.e., under the no-action alternative). This document constitutes Section 6 of the remedial investigation report for Operable Unit 1 (OU1) of the site (Exponent 2000) and relies on data collected during that investigation. This version of the HHRA updates the draft that was submitted in April 2001 and reflects comments and responses to comments subsequent to that submittal (NJDEP 2001, 2003; NJDEP and U.S. EPA 2002; Exponent 2001a,c, 2002).

The assessment was conducted consistent with U.S. Environmental Protection Agency (EPA) and New Jersey Department of Environmental Protection (NJDEP) guidance, with the 1996 work plan for the site (CRA 1996), and with ongoing communication between Exponent staff and EPA and NJDEP on behalf of Rohm and Haas. The draft remedial investigation report was submitted in September of 2000 and an ecological risk assessment was submitted in 2001 (Exponent 2001b); revision of the remedial investigation and ecological risk assessment are on hold pending review of the recently submitted draft technical memorandum for screening of remedial technologies and development of alternatives (Exponent 2003).

The risk assessments are part of the remedial investigation and feasibility study (RI/FS) required by the Resolution of the Berry's Creek/Wood-Ridge Site Action Committee (Resolution) with NJDEP, executed on August 15, 1996. The Resolution is an amendment to the October 26, 1984, Stipulation and Supplementary Order Approving Cooperative Agreement for Remedial Investigation and Feasibility Study and Amending Procedural Order Involving Remedy (Stipulation). The Stipulation covers the approximately 38-acre site and the areas of Berry's Creek that are potentially affected by industrial activity at the site, while the Resolution provides for implementation of a separate RI/FS for the site. The site is designated as a National Priorities List site identified by EPA number NJD980529879, and bearing Comprehensive Environmental Response, Compensation and Liability Information System ID number 02C7.

This document presents the results of the HHRA for OU1 of the site and it supplements the remedial investigation for the site (Exponent 2000). This HHRA was conducted using analytical results from samples of soil, groundwater, water from seeps, sediments, and air collected during Phase I, Phase IA, and Phase 1A supplemental field investigations. The HHRA also draws on information presented in the draft remedial investigation report on site background, hydrology, climate, and demographics. This HHRA is structured in accordance with the guidance for risk assessment as discussed in the specific sections on HHRA (Section 3) under the EPA Comprehensive Environmental Response, Compensation and Liability Act of 1980 (U.S. EPA 1988) and within NJDEP. This section provides a brief description of the site, applicable guidance documents, and the organization of this report and appendices. Section 2 describes the conceptual model, and the remainder of the report describes the methods and findings of the HHRA.

1.1 Site Description

The site is located in Bergen County, New Jersey, within the boroughs of Wood-Ridge and Carlstadt (Figure 1-1). In accordance with instructions in an April 1, 1999, letter from NJDEP (Zervas 1999, pers. comm.), the site has been divided into two operable units: OU1 and OU2 (Figure 1-2); only OU1 is addressed here. The two operable units together make up an irregularly shaped, approximately 38-acre parcel within an industrialized area of northeastern New Jersey. Approximately 15.7 of the 38 acres are within the Borough of Wood-Ridge, and the remaining 22.6 acres are within the Borough of Carlstadt. The entire site is generally within the Hackensack Meadowlands area. The site is bordered to the east by Berry's Creek; to the west by the West Ditch, the Diamond Shamrock/Henkel and Randolph Products properties, and Park Place East; to the south by the Diamond Shamrock/Henkel Ditch (south) and Nevertouch Creek; and to the north by Ethel Boulevard and a railroad track (Figure 1-2). Two active commercial/industrial facilities and a lot, on which a publicly owned treatment works was formerly located, lie immediately north of Ethel Boulevard and the railroad track. The railroad crosses Berry's Creek at the northeast corner of the site and continues south along the eastern side of Berry's Creek.

Land use in the immediate vicinity of the site is primarily commercial/industrial. Teterboro Airport is approximately 0.6 mile to the north, State Highway 17 is approximately 500 ft to the west, and the Meadowlands Sports complex is approximately 1 mile to the south. The immediately adjacent Diamond Shamrock/Henkel property is undergoing an active remediation program under the NJDEP Environmental Cleanup Responsibility Act. The closest residential area is approximately 750 ft to the north.

Groundwater hydrology is described in Section 3 of the remedial investigation. Groundwater at the site discharge toward Berry's Creek. As with all groundwater in the state, site groundwater is designated by the State of New Jersey as potable and Berry's Creek is included on New Jersey's Clean Water Act Section 303(d) list for toxic pollutant impairment (www.epa.gov/fedrgstr/EPA-WATER/2001/October/Day-09/w25258.htm). Other surface water bodies identified in OU1 (i.e., the onsite basin and the West Ditch) are very small and do not have surface water designations. Additional information on topography and surface features, climate and meteorology, geologic setting, soils, hydrology, hydrogeology, ecology, demography, and land use is available in the draft remedial investigation report (Exponent 2000).

As indicated above, the site is divided into two units—OU1 and OU2—and only OU1 is evaluated herein. OU1 includes two areas—one developed and one undeveloped (Figure 1-2) and includes the West Ditch and the onsite basin. All other surface water including Diamond Shamrock/Henkel Ditch (north), and Berry's Creek will be evaluated with OU2. The developed portion of OU1 covers approximately 7 acres and includes two active warehouses—the Wolf and U.S. Life Warehouses (Figure 1-2). The former mercury processing facility was located on the portion of OU1 that is now occupied by these warehouses. The remainder of the developed area of OU1 is covered with asphalt pavement or with gravel, which forms the bed for railroad tracks located immediately behind the warehouses. The only soil in the developed area that is not covered by pavement is beneath the gravel bed of these railroad tracks. Drainage from the developed area is directed generally between the two warehouses and the Randolph Products property, and it flows into the West Ditch (Figure 1-2) along the western property boundary.

The undeveloped area of OU1 lies generally south of the developed area and includes approximately 19 acres of land that was filled but not developed. This portion of OU1 is

bordered to the north by the railroad track, to the south by the Diamond Shamrock/Henkel Ditch (north), to the west by the West Ditch, and to the east by Berry's Creek (Figure 1-2). The undeveloped filled area of OU1 is characterized by mixed vegetation and a variety of surficial debris. Much of this area is relatively flat, but the northeast portion has uneven terrain. Two surface features are a small pit, which may include remnants of an access structure for the drainage system from the Plant area that extended to Berry's Creek, and a small basin, hereafter referred to as the onsite basin. The onsite basin may be a remnant of a settling basin for discharges from the Plant area or the Randolph Products property (Figure 1-2). The east and south perimeters of this area are steep stream banks adjacent to Berry's Creek and the Diamond Shamrock/Henkel Ditch (north), respectively. The north and west perimeters of the area are fenced; additional fencing to the east prevents site access via the tide gate.

The remaining 12 acres of the site are within OU2 and are located south of the undeveloped filled area (Figure 1-2); OU2 is not considered further herein.

1.2 Applicable Guidance

The risk assessment was conducted in accordance with current NJDEP and EPA guidance, including, but not limited to, the following documents:

- *Soil Cleanup Criteria.* www.state.nj.us/dep/srp/regs/scc/index.html. Provided by the State of New Jersey, Department of Environmental Protection, Trenton, NJ. These values have not been promulgated but will be considered during the compilation of applicable or relevant and appropriate requirements.
- *Risk Assessment Guidance for Superfund: Volume 1 — Human Health Evaluation Manual* (Parts A and D) (U.S. EPA 1989, 1998)
- *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance "Standard Default Exposure Factors"* Interim Final (OSWER Directive # 9285.6-03) March 1991

- *Exposure Factors Handbook* (U.S. EPA 1997a)
- EPA Region IX preliminary remediation goals (PRGs) table (U.S. EPA 2003a)
- *Risk Assessment Guidance for Superfund (RAGS) Volume 1: – Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Review Draft for Public Comment* (U.S. EPA 2001)
- *Supplemental Guidance to RAGS: Calculating the Concentration Term* (U.S. EPA 1992) and *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites* (U.S. EPA 2002a)
- Johnson and Ettinger model software developed by U.S. EPA (2002b) and Andelman Model as modified by Schaum et al. (1994)
- *Guidance for Data Usability in Risk Assessment* (U.S. EPA 1990a).

Most of these documents were included in the revised list of guidance documents submitted to NJDEP in January 2001 (Hock 2001, pers. comm.). In some cases, more recent documents were requested by NJDEP/EPA in comments on the draft HHRA (NJDEP 2001, 2003), or in subsequent communications.

1.3 Organization

Site background information and applicable guidance documents were summarized in Sections 1.1 and 1.2. Sections 2 through 6 describe the results of the four steps recommended in EPA guidance for risk assessment:

- Data evaluation and identification of CoPCs
- Exposure assessment
- Toxicity assessment

- Risk characterization.

An uncertainty assessment is included in the risk characterization to place potential risks in context. The uncertainty assessment discusses HHRA assumptions that may lead to over- or underestimates of potential site risks. The following supporting information is provided in appendices to the HHRA:

- **Appendix A, EPA RAGS D Tables**—This section provides all tables required in the RAGS Part D Tables 1–10. These tables present all quantitative aspects of the HHRA including: data summaries and the basis for selecting CoPCs; exposure assessment assumptions (i.e., derivation of exposure point concentrations [EPCs], exposure parameter assumptions); risk estimates for each CoPC in each potentially complete exposure pathway; and cumulative risk estimates for each receptor in each scenario.
- **Appendix B, Region IX Tables of Screening Values**—Provides tables of EPA-derived risk-based concentrations (RBCs) used in the selection of CoPCs (U.S. EPA 2003a) (as requested by EPA Region II).
- **Appendix C, Additional Modeling Documentation**—Provides additional tables and documentation on both the Johnson and Ettinger modeling and the Andelman modeling.

2 Conceptual Site Model

In January 2001, Exponent submitted a draft human health and ecological conceptual site model for OU1 of the site on behalf of Morton International and Velsicol Chemical Corporation (Henry 2001, pers. comm.). This conceptual site model was developed based on site history, site conditions, and the analytical results of site media samples presented in the draft remedial investigation report (Exponent 2000). The conceptual site model has been updated based on input from NJDEP and EPA. The conceptual site model identifies potential sources, transport mechanisms, exposure media, exposure routes, and human and ecological receptors. These elements of the conceptual site model are summarized below, followed by a discussion of the relationships among these elements. Figure 2-1 provides an overview of the conceptual site model for human receptors. In addition, Sections 4 and 5 of the draft remedial investigation report provide a detailed description of the nature and extent of contamination, and of the transport and fate of CoPCs, respectively.

2.1 Sources and Transport Pathways

As described in the remedial investigation, possible sources of CoPCs were former operations within the developed areas and direct disposal of wastes and fill in the undeveloped area. The main operations within the developed area were the manufacture and reclamation of mercury compounds. Metals and any other process-related chemicals could have been deposited on soils through leaks, spills, and past waste handling practices. The undeveloped area (an approximately 19-acre area between the developed area and Berry's Creek) was used as a disposal area for various materials, including demolition material and domestic solid waste.

Possible release mechanisms for the CoPCs include potential spills and leaks of chemicals managed in the developed area (although none have been documented) and previous activities in the area. Within the undeveloped area, release mechanisms include direct disposal and subsequent leaks from any containers. Where releases to soil occurred, the secondary transport

mechanisms for CoPCs include potential infiltration and percolation to subsurface soil and shallow groundwater, stormwater runoff, and windborne dust and/or volatile emissions.

Offsite transport of chemicals in soil via stormwater runoff or in groundwater may have resulted in releases to surface water within OU1 (i.e., the West Ditch and the onsite basin), or to OU2 (i.e., the Diamond Shamrock/Henkel Ditches [north or south] and Berry's Creek). Potential exposure media in the West Ditch and the onsite basin include sediments and surface water. No fish have been observed in these surface waters, nor does this appear to be suitable habitat for consumable fish. Offsite transport to OU2 including potential impacts on sediments, water, and biota will be evaluated in the RI/FS for OU2.

Volatilization of chemicals from soil or shallow groundwater to indoor or outdoor air, and to a lesser extent, the suspension of fine soil particulates, are also potential transport pathways. Because of the presence of soil coverage within the developed area, air pathways are expected to be less significant than direct-contact pathways (i.e., ingestion and dermal absorption). However, both outdoor and indoor air pathways are evaluated in the HHRA.

2.2 Potential Human Receptors and Pathways

A complete exposure pathway exists only when a receptor population can be exposed to chemical constituents associated with the site. OU1 is currently under commercial use within the developed area and is fallow within the undeveloped area. Wood-Ridge has zoned this area as "light industrial park" (Kolicko 1997, pers. comm.), so future residential use is considered unlikely. The current potential for exposure to site media is low, because the site is fenced on three sides, and because the developed area is largely covered by buildings and pavement.

At least one CoPC has been detected in OU1 soil, groundwater, sediments, surface water, and outdoor air. In addition, modeling estimates were used to derive hypothetical indoor air concentrations for volatile CoPCs in soil and groundwater. The potential for receptors to contact CoPCs in each of these media and in indoor air was evaluated in the HHRA. Table 1 of

Appendix A summarizes all potential exposure pathways and Figure 2-1 is a schematic representation of these potential exposure pathways.

Given the characteristics of the property, including current use and zoning regarding future use, the most likely potential human receptors include onsite workers and trespassers who might visit the site. Onsite workers (including long-term workers and construction workers) are likely to be the receptor population with the highest exposure potential. Future onsite residential use of this site is highly unlikely. However, because site groundwater is designated as potable drinking water by the State of New Jersey, use of groundwater as domestic drinking water is evaluated in a hypothetical scenario. Although offsite residents could potentially inhale fugitive dust generated from the site, the magnitude of exposure via this pathway would be far less than for onsite workers.

2.2.1 Current and Future Workers

Current and future onsite worker scenarios were evaluated for the developed area, in which workers are exposed to CoPCs in surface soil, subsurface soil, groundwater, and to mercury in outdoor air. Volatilization of CoPCs from soil or groundwater to indoor air was also evaluated. As indicated above, the developed area is nearly all paved. Therefore, in the current scenario for the developed area, only unpaved soils were considered. In contrast, a future worker scenario for the developed area included consideration of paved and unpaved soils. A future worker scenario was also evaluated for the undeveloped area. Although future development is unlikely to take place without surface soil modification (i.e., adding fill, which would reduce CoPC concentrations), such use was evaluated in a hypothetical scenario for purposes of the risk assessment. Pathways evaluated for current and future long-term worker contact with CoPCs in surface soil included ingestion and dermal contact. In addition, exposure to mercury in outdoor air, and to volatile constituents from soil or groundwater in indoor air were also evaluated. Risks associated with exposure to CoPCs in subsurface soil were evaluated through a current and future trench worker scenario, in which workers contact CoPCs in subsurface soil through incidental ingestion and dermal contact.

As discussed above, site groundwater is not used as drinking water, and such use is not expected and is highly unlikely in the future. However, to determine whether use of groundwater as drinking water could result in unacceptable risks, ingestion and limited dermal contact with CoPCs in groundwater were evaluated for workers in a hypothetical future scenario.

2.2.2 Trespassers

The most likely current receptor within the undeveloped area would be a trespasser who might gain access. Potential exposure pathways would include ingestion of and dermal contact with surface soil, sediments, and surface water within the undeveloped area. The most likely human populations to trespass in and around the undeveloped area are adults and older children (i.e., 9–18 years old). Younger children would not be expected to visit these areas given the limited access.

Although it is hypothetically possible for chemicals in site soil and surface water to be taken up into plants or into aquatic organisms consumed by trespassers, these pathways are considered incomplete because of site characteristics, the quality of the vegetation, and conditions at the site. During the site visits, no edible plants were noted. The surface water within the OU1 area, the West Ditch, and the onsite basin was determined not to support fish or other aquatic organisms that would be consumed by people. Therefore, this pathway is not considered complete.

2.2.3 Future Hypothetical Domestic Use of Drinking Water

As described above, although residential use is thought to be highly unlikely at this site, the aquifer is defined by the State of New Jersey as potable. Therefore, in order to evaluate the highest possible future use of groundwater, groundwater CoPCs are evaluated in a future hypothetical residential drinking water scenario. This analysis included evaluation of ingestion, dermal contact, and inhalation of CoPCs that might volatilize from groundwater during bathing or showering.

3 Data Analysis and Identification of Chemicals of Potential Concern

Data presented in the remedial investigation report (Exponent 2000, Section 4, and Appendix B) were the basis of the risk assessment. These data and the comparisons with screening concentrations are presented in Appendix A, Tables 2.1 through 2.10. The HHRA uses a conservative screening process to select CoPCs to ensure that any substances that could be of concern are evaluated fully. All available chemical concentration data were reviewed to identify CoPCs in the following media:

- Surface soil/sediments
- Subsurface soil
- Surface water
- Groundwater
- Air.

As described in the draft remedial investigation report (Exponent 2000), drums and test pits containing waste material were sampled and analyzed during the remedial investigation. Although these materials were not entirely soil, site users could contact the material because it was collected on the soil surface. Therefore, these data were included in the screening and risk calculations conducted in this HHRA. Some of the samples were characterized as hot spots based on very high sample concentrations (i.e., more than 100 times the screening RBC). These samples were not included in the reasonable maximum exposure (RME) risk estimates, but they were used to derive risk estimates for the uncertainty assessment and will be further addressed in the feasibility study.

Tables 2.1 through 2.9 of Appendix A provide a summary of OU1 data and data. These tables present the occurrence, distribution, and selection of CoPCs and provide the following information as specified in U.S. EPA (1998):

- Chemicals detected and undetected in each medium
- Frequency of detection of chemicals in each medium
- Range of detected concentrations for each chemical in each medium
- Range of detection limits for the chemicals in each medium
- Background screening values for metals in suburban New Jersey soils (for comparison only) (NJDEP 1993)
- Screening concentrations (i.e., RBCs), when available, for exposure to residential soil, for residential use of drinking water, or for inhalation.

Table 3-1 shows a simple summary of CoPCs identified in site media. Appendix A Tables 3.1 through 3.13 present EPCs calculated for each CoPC in each exposure medium, and additional supporting documentation consistent with EPA guidance (U.S. EPA 1998). Figure 3-1 shows sample locations for data used in the HHRA. The following sections describe how OU1 data were used to identify CoPCs.

Maximum concentrations of analytes in OU1 media were reviewed to compile a list of CoPCs for human health.[1] The methods used to select CoPCs were intended to ensure that no contaminants detected at levels of potential health concern would be excluded. Maximum concentrations of contaminants in all media were compared with conservative RBCs derived by EPA. RBCs used in this screening process were developed by EPA Region IX. The RBCs for soil account for three potential exposure routes: ingestion, inhalation of particles or vapors, and dermal contact. The RBCs for tap water account for ingestion of water and inhalation of volatiles from water. RBCs for ambient air (in a residential setting) were used to screen the air data (U.S. EPA 2003a). The RBCs correspond to either a 1×10^{-6} excess cancer risk (for carcinogens) or a hazard quotient of 0.1 (for noncarcinogens), whichever is more stringent. Appendix B includes copies of the original sources of EPA RBCs used in screening CoPCs.

[1] All chemicals except lead were evaluated based on maximum concentrations. Lead in site media was evaluated based on average concentrations consistent with the use of average inputs in the EPA integrated exposure uptake/biokinetic model.

Data on site-specific background concentrations of inorganic chemicals were not available. Comparison of maximum site concentrations with samples collected from background locations in New Jersey soils suggests that site concentrations for some inorganic chemicals are within levels typically identified in background soils. EPA staff have indicated that chemicals should not be screened out of the risk assessment based on their presence at background concentrations. Instead, the concentration relative to background can be considered as part of risk management decision-making at the site (Sivak 2001, pers. comm.). The uncertainty assessment includes a discussion of site concentrations relative to background concentrations. As indicated there, some of the risks identified in the assessment may be related to naturally occurring chemicals in soil. The contribution to site risks related to background concentrations should be considered in evaluating the need for site remediation or site controls.

Maximum detected concentrations of chemicals in surface soil/sediments and subsurface soils in the developed and undeveloped areas were compared with EPA-derived RBCs for residential soil as a conservative means of evaluating direct contact with these media. Use of the RBCs derived for residential soil to screen for CoPCs in these media is highly conservative, because these values are based on daily contact with soil in a residential scenario, whereas exposures to soil/sediments would be restricted to occasional contact during trespassing activities, or short durations during construction activities. Such exposures would be expected to be less frequent than exposures that a child might receive at a residence. Consequently, the use of residential screening numbers is expected to provide a conservative (i.e., health protective) means to screen the site data to identify CoPCs for nonresidential uses evaluated in the HHRA.

Maximum chemical concentrations in surface water (the onsite basin and the West Ditch) and OU1 groundwater were compared with their respective RBCs, derived by EPA based on assumed levels of exposure resulting from the use of water as a residential drinking water source. This method is a highly conservative screening procedure, because no site surface water or groundwater is used for drinking water. Similarly, concentrations of mercury detected in outdoor air were screened through comparison with an RBC derived on the basis of exposure to air in a residential setting (U.S. EPA 2003a).

Consistent with guidance contained in U.S. EPA (1989), data were also evaluated in light of the following considerations:

- Although EPA indicates that chemicals can be excluded based on frequency of detection, no chemicals were excluded on this basis, because no chemicals that were detected had low detection frequencies.
- A compound can be eliminated from consideration if it is an essential nutrient, present at low concentrations, and toxic only at high doses. Consistent with EPA guidance (U.S. EPA 1989), several essential nutrients (i.e., calcium, magnesium, potassium, sodium) were not included as CoPCs.
- If common laboratory chemicals (e.g., acetone, methylene chloride, toluene, phthalate esters) are found at less than 10 times the maximum concentration detected in any blank, or if other chemicals are found at less than 5 times the maximum concentration detected in any blank, these chemicals can be eliminated. No chemicals were excluded on this basis.

After consideration of the issues described above, chemicals were identified as CoPCs if the maximum concentration detected in an environmental medium exceeded the respective RBC.

3.1 Soil and Sediment

The soil data were considered in four groups: surface soils in the developed area, surface soils in the undeveloped area, and subsurface soils in the developed and undeveloped areas. Data for sediment samples in the undeveloped area constituted a fifth data group that was also screened for CoPCs. The screening of these data is discussed in the following sections.

3.1.1 Surface Soils in the Developed Area

Up to 15 samples were collected from the developed soil area at 0–12 in. deep. Because the developed area is nearly all paved, only three of these samples were from unpaved areas (SS-14,

SS-15, SS-16); these were collected under gravel in the railroad bed. As described above in the conceptual model, the unpaved soils within the developed area were considered in a current worker scenario, while unpaved and paved soils together were considered in a future scenario. Therefore, given these different expected exposure patterns for current and future use, separate EPCs were calculated for the combined paved and unpaved soils and for the paved soils alone.

Eight metals were identified as CoPCs in surface soils within the unpaved soils in the developed area: aluminum, arsenic, chromium, copper, iron, manganese, mercury, and vanadium. Three polycyclic aromatic hydrocarbon (PAH) compounds exceeded their RBCs and were identified as CoPCs: benzo[b]fluoranthene, benzo[a]pyrene, and dibenz[a,h]anthracene. All other organic compounds were found in concentrations less than their RBCs (Tables 2.1 and 3.1 in Appendix A).

Considering the paved and unpaved soils together, all the same CoPCs were found, with the addition of three other CoPCs. Thallium, benz[a]anthracene, and benzene were also present at concentrations greater than their RBCs and were included as CoPCs within the future scenario for exposure to paved and unpaved soil together within the developed area (Tables 2.2 and 3.1 in Appendix A).

3.1.2 Surface Soils and Sediment in the Undeveloped Area

Up to 45 samples were collected from the undeveloped soil area at the 0- to 12-in. depth. These included sediment samples collected at five locations in the onsite basin, and the West Ditch. Ten metals were identified as CoPCs in surface sediments within the undeveloped area. Nine were selected based on screening against toxicity values: aluminum, arsenic, cadmium, chromium, iron, mercury, thallium, vanadium, and zinc. Methylmercury was also included as a CoPC based on historical use.

Of the 24 organic compounds detected, seven compounds or mixtures exceeded their RBCs. These included five PAH compounds (i.e., benz[a]anthracene, benzo[b]fluoranthene, benzo[a]pyrene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene) and two polychlorinated

biphenyl (PCB) Aroclors® (Aroclors® 1248 and 1260). These compounds or mixtures were identified as CoPCs (Tables 2.5 and 3.2 in Appendix A).

The remaining 40 samples included surface soils and waste samples from test pits and drummed waste spills. Of the 61 substances detected in soils and wastes, 25 exceeded the toxicity screening values. In addition to the nine metals listed above, antimony, barium, copper, lead, manganese, nickel, and silver are CoPCs in surface soils and wastes. Nine organic compounds exceeded the screening toxicity values for residential soils. These included two noncarcinogenic PAHs (2-methynaphthalene and naphthalene) and five carcinogenic PAHs (benz[a]anthracene, benzo[b]fluoranthene, benzo[a]pyrene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene). These seven PAH compounds, plus bis[2-ethylhexyl]phthalate and Aroclor® 1248, were identified as CoPCs (Tables 2.4 and 3.2 in Appendix A).

3.1.3 Subsurface Soils in the Developed and Undeveloped Areas

Screening of subsurface soils was conducted for subsurface samples from the developed and undeveloped areas separately. Up to 135 subsurface soil samples were taken from depths of 1–20 ft below ground surface (31 samples in the developed area and 104 in the developed area were analyzed for mercury). Eight metals were identified as CoPCs in the developed area subsurface soils: arsenic, barium, chromium, copper, iron, manganese, mercury, and thallium. One noncarcinogenic PAH (2-methylnaphthalene) plus two additional organic chemicals (benzene and Aroclor® 1260) were identified as CoPCs (Tables 2.5 and 3.3 in Appendix A).

Seventeen metals were identified as CoPCs in the undeveloped area through screening. These included the eight metals listed above, plus aluminum, antimony, cadmium, lead, nickel, selenium, silver, vanadium and zinc. Methylmercury was also included as a CoPC based on historical use. Six carcinogenic PAHs (i.e., benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene) and three noncarcinogenic PAHs (i.e., 2-methylnaphthalene, benzo[ghi]perylene, and naphthalene) were identified as CoPCs. In addition, the following four organic chemicals

were identified as CoPCs: PCBs (Aroclors® 1242, 1248, and 1254), carbazole, toluene, and xylene (Tables 2.6 and 3.4 in Appendix A).

Review of the data for 2-methylnaphthalene indicated that the subsurface soil in the developed area had only one reported result at a concentration of 11 mg/kg. This is because concentrations below the detection limit were not reported. In contrast, within the undeveloped area there were 44 samples, with 12 detects and a maximum of 8.8 mg/kg. Given the uncertainty related to the application of a single data-point, particularly for 2-methynaphthalene, where the evaluation is based on a surrogate (naphthalene) in the absence of a toxicity value, the risk assessment applied the more complete analytical data for 2-methynaphthalene from the undeveloped area.

3.2 Surface Water

Chemicals in surface water were compared with EPA Region IX RBCs based on residential drinking water consumption (U.S. EPA 2003a). Screening of surface water in OU1 was conducted for all samples together. Surface water samples from five stations in the West Ditch and the onsite basin were evaluated. Four metals were identified as CoPCs in surface water: iron, manganese, and mercury. In addition, although the maximum concentration was below the screening level, methylmercury was included at the request of NJDEP. No organic chemicals were identified as CoPCs (Tables 2.7 and 3.5 in Appendix A).

3.3 Groundwater

Screening of groundwater in OU1 was conducted for all samples site-wide. Groundwater samples were collected from the 15 monitoring wells located in the developed and undeveloped filled areas. Ten metals were identified as CoPCs in groundwater: arsenic, barium, cadmium, copper, iron, manganese, mercury, nickel, thallium, and vanadium. Methylmercury was included as requested by NJDEP. Two noncarcinogenic PAHs (i.e., 2-methylnaphthalene and naphthalene) were identified as CoPCs. In addition, twelve organic chemicals were identified as CoPCs: bis[2-ethylhexyl]phthalate, 1,4-dichlorobenzene, 4-methylphenol, 1,2-dichlorothene

isomers, ethylbenzene, 4-methyl-2-pentanone, acetone, benzene, chlorobenzene, chloroethane, toluene, and xylene (Tables 2.8 and 3.6 in Appendix A).

3.4 Air

Consistent with the work plan for the site and the primary importance of mercury as a site contaminant, mercury was the only site contaminant sampled in outdoor and indoor air. As requested by EPA and NJDEP, this assessment includes evaluation of estimated concentrations of volatile CoPCs in indoor air. Two transport pathways are considered: 1) migration from soil or groundwater to indoor air, which is evaluated through application of the Johnson and Ettinger Model as recommended by U.S. EPA (2003c); and 2) volatilization of contaminants from drinking water to indoor air, which is evaluated in a hypothetical future residential drinking water scenario through application of the Andelman Model as modified by Schaum et al. (1994) and NJDEP (2003). The methodology used in these models is discussed further in Section 4.

Based on available sampling data, mercury vapor was identified as a CoPC in outdoor air (Tables 2.9 and 3.7 in Appendix A). Air samples were collected during the Phase I field investigation, during the warehouse evaluation study, and by NJDEP. During the Phase I investigation, particulate mercury and total gaseous mercury were measured in five samples collected in September and October 1997, and total gaseous mercury was measured in six samples collected in March 1998. In the supplemental warehouse study, gaseous mercury was measured at three locations inside the U.S. Life (Jerbil) Warehouse and at two outside locations in April 1999. Both particulate and gaseous mercury were measured by NJDEP in 1989 and 1990. Six samples were taken at three locations within OU1, one of which was above the limit of detection. Given the uncertainty in the early data regarding sampling methods, and the availability of 16 samples from a recent investigation, the single detected sample from the NJDEP sampling was not included in this HHRA.

Inhalation of CoPCs in outdoor air is an additional potential exposure pathway. In order to evaluate the magnitude of this pathway, maximum soil concentrations of all CoPCs were compared with RBCs derived by EPA Region IX to be protective of inhalation exposures.

Specifically, as described above, EPA Region IX calculates RBCs termed PRGs based on conservative assumptions about exposure through inhalation, dermal contact, and ingestion (U.S. EPA 2003b). EPA calculates soil concentrations that would be protective of particulates re-suspended from soil for each chemical that has a toxicity value for inhalation. Table 2.10 in Appendix A shows the relative influence of potential human exposure pathways, including inhalation of particulates from soil, on RBCs for residential soil.

The models used to calculate RBCs for inhalation of particulates from soil are from the EPA *Soil Screening Guidance: User's Guide and Technical Background Document* (U.S. EPA 1996a,b). EPA applies conservative assumptions regarding inhalation rates (i.e., 20 m^3 per day for an adult and 10 m^3 per day for a child) over 350 days per year and 30 years, and a particulate emissions factor derived in the EPA soil screening guidance. The EPA Region IX modeling for this pathway also applies conservative assumptions regarding the amount of emission and deposition of particles onto soil.

As shown in Appendix A, Table 2.10, the RBCs derived for outdoor inhalation of metals from soil are much higher than the maximum concentration of all of the metals identified in site soils except chromium (as chromium(VI)). The maximum concentration of 9,840 mg/kg for chromium was found in subsurface soil. The maximum chromium surface soil concentration was 1,150 mg/kg, which is below the 4,529 mg/kg residential screening level. Given the conservative nature of the residential RBC used in this screening, the concentration two times greater than that screening value would be a negligible contribution to the site risk estimate under the expected occupational use. In addition, several semivolatile or volatile chemicals (e.g., benzene, methyl naphthalene and naphthalene) had site concentrations close to the inhalation RBCs. However, all of these chemicals were evaluated in the indoor air modeling to provide a more conservative estimate of risk resulting from the potential for buildup of contaminants in indoor air assumed in the model.

4 Exposure Assessment

Exposure assessment is the process of identifying human populations that could potentially contact site-related chemicals and estimating the magnitude, frequency, duration, and route(s) of potential exposures. In this HHRA, potential OU1 risks were evaluated in hypothetical current and future workplace scenarios, and in a future trespasser exposure scenario. In addition, potential exposure to subsurface soil was considered for a construction worker. A residential population was not considered here, given the nature of the area (i.e., limited zoning and access), which makes future residential development unlikely. This section describes how these scenarios were selected as a conservative means of estimating current and hypothetical future exposures and potential risks. First, the exposure setting was characterized, and potentially exposed populations were identified (i.e., trespassers, workers, and hypothetical future residential users of drinking water). Next, potential exposure pathways were identified, and the methods and assumptions for quantifying exposure were presented.

4.1 Exposure Setting and Receptor Populations

Given the OU1 characteristics, current use, and zoning regarding future use, the most likely potential human receptors include onsite workers and trespassers who might visit OU1. Onsite workers are likely to be the receptor population with the highest exposure potential. In addition, although residential use is thought to be highly unlikely at this site, the aquifer is defined by the State of New Jersey as potable. Therefore, in order to evaluate the highest possible future use of groundwater, groundwater CoPCs are evaluated in a future hypothetical residential drinking water scenario. Although offsite residents could potentially inhale fugitive dust generated from OU1 media, the magnitude of exposure via this pathway would be far less than for onsite workers.

CoPCs have been detected in OU1 soil and groundwater, and in sediments and surface water within OU1. The current potential for exposure to media at OU1 is low, because it is fenced on

three sides and the developed area is largely covered by buildings and pavement. The potential for receptors to contact CoPCs in each of the media was evaluated.

4.2 Potential Exposure Pathways

This section identifies potential exposure pathways for CoPCs found in environmental media. An exposure pathway is the course a chemical takes from a source to an exposed receptor. Exposure pathways consist of the following four elements: 1) a source; 2) a mechanism of release, retention, or transport of a chemical in a given medium (e.g., air, water, soil); 3) a point of human contact with the medium (i.e., exposure point); and 4) a route of exposure at the point of contact (e.g., incidental ingestion, dermal contact). If any of these elements is missing, the pathway is considered incomplete (i.e., it does not present a means of exposure). Only those exposure pathways judged to be potentially complete are quantified in the HHRA. Appendix A Table 1 summarizes the exposure pathways evaluated in the HHRA and is consistent with Table 1 of U.S. EPA (1998).

At least one CoPC has been detected in each of the media evaluated—surface soil, subsurface soil, surface water, groundwater, and air. As described above, the most likely means for human exposure to these CoPCs is through workplace use of, or trespassing on, these areas. Opportunities for exposure to CoPCs are generally very low because of the limited access to any site area and to surface soil within the developed area.

4.3 Quantification of Exposure

In this section, CoPC intakes for chronic exposures are estimated for the exposure pathways identified in the previous section. CoPC intakes are based on estimates of exposure concentrations at the exposure point (i.e., EPCs) and on the estimated magnitude of exposure to CoPC-containing media. Exposure estimates for chronic daily intakes (CDIs) are defined as the mass of a CoPC taken into the body, per unit of body weight, per unit of time. For dermal contact, exposures are expressed as absorbed dose rather than administered dose.

The averaging time used to determine a CDI depends on the type of toxic effect being assessed. For carcinogenic effects, CDIs are calculated by averaging the total cumulative dose over a lifetime. The estimate of the average lifespan is assumed to be 70 years, based on EPA guidance (U.S. EPA 1991).[2] For assessing noncancer effects, CDIs are calculated by averaging intakes only over the period of exposure. The distinction between these two approaches is based on EPA's currently held opinion that the toxicological mechanisms of action are different for carcinogenic and noncarcinogenic processes.

Intakes of CoPCs were estimated using algorithms and assumptions consistent with EPA guidance (e.g., U.S. EPA 1989) for the following potential exposure pathways:

- **Surface soils in the developed area**—Incidental ingestion, and dermal contact with CoPCs by long-term workers and construction workers
- **Surface soils in the undeveloped area**—Incidental ingestion, dermal contact with CoPCs by long-term workers, construction workers, and trespassers who might visit OU1
- **Subsurface soils in the developed and undeveloped areas**—Ingestion and dermal contact with CoPCs in subsurface soils by construction workers
- **Surface water and sediments in OU1**—Incidental ingestion and dermal contact with surface water and sediment by an adult or older child trespasser who might contact CoPCs in the onsite basin and the West Ditch
- **Groundwater**—Ingestion and dermal contact of CoPCs in groundwater are evaluated in hypothetical OU1-wide future long-term worker and resident scenarios
- **Outdoor air**—Inhalation of mercury vapor in outdoor air by long-term workers in the developed or undeveloped area

[2] EPA's most recent edition of the *Exposure Factors Handbook* (U.S. EPA 1997a) recommends use of 75 years for the average value for life expectancy; however, the original 70-year value is used in this risk assessment for consistency among risk assessments, and because some of the CSFs and unit risks (see Section 5) are derived based on a 70-year lifetime, and the difference (error) between the two values is low.

- **Indoor air CoPCs migrating from subsurface soil or groundwater—** Inhalation of volatile contaminants in indoor air by long-term workers in the developed or undeveloped area

- **Indoor air CoPCs migrating from domestic groundwater—**Inhalation of volatile contaminants in indoor air during and after showering or bathing by residents who use groundwater for domestic drinking water.

Both RME and central tendency estimates were calculated. EPA describes RME as the highest exposure that is reasonably expected to occur at a site (U.S. EPA 1989). EPA, in the *Final Guidelines for Exposure Assessment*, defines typical (or central tendency) exposures as follows:

> The average [exposure or dose] estimate, used to describe the arithmetic mean, can be approximated by using average values for all the factors making up the exposure or dose equation (57 Fed. Reg. 104:22888).

The following subsection presents the exposure algorithms and assumptions used to calculate CDIs for each of the exposure pathways listed above, and the methods used to calculate EPCs for the RME and central tendency cases.

4.3.1 Exposure Frequency and Duration and Receptor Characteristics

As described above, the most likely human populations to use the area are workers, although trespassers could also visit OU1. Worker scenarios considering exposure to surface and subsurface soil and to outdoor air were evaluated for the developed and undeveloped areas. In the developed area, current and future worker scenarios were evaluated to consider current exposure to unpaved soil and future exposure to all soil (i.e., including soil now under pavement). A future long-term worker scenario was also evaluated for the undeveloped area. While future development as a workplace would likely require some modifications to the undeveloped area soil, this hypothetical future scenario was evaluated under baseline conditions to determine whether site controls would be needed. The exposure frequency for the long-term worker in both the RME and central tendency scenarios was 250 days per year, as identified by EPA (U.S. EPA 1997a). The exposure duration for the worker is 25 years for the RME

scenario, as identified by U.S. EPA (1991). For the central tendency scenario, a 6.6-year duration is applied. This provides a conservative means to evaluate exposure, because 6.6 years was identified as the median amount of time that workers spend in one occupation (U.S. EPA 1997a).

A construction worker scenario was also evaluated to consider hypothetical current or future contact with surface and subsurface soils in the developed and undeveloped areas. Consistent with the request from NJDEP (2001), the construction worker scenarios assumed workers contact soils for three months per year (i.e., 60 days/year) in the RME, or 25 days/year in the central tendency scenario, over a 2-year construction period. The worker's body weight was assumed to be 70 kg.

A trespasser scenario was considered for the undeveloped area. The developed area has more limited access, and any risk for a trespasser who might gain access would be less than that estimated for a long-term worker. For the undeveloped area, the most likely trespassers are adults and older children (i.e., 9–18 years old). Younger children would not be expected to trespass within the area, given the limited access. In this assessment, trespassers were assumed to be exposed either to soils or sediment and surface water on a given visit. Trespassing within the undeveloped area is unlikely, and any occurrence is expected to be infrequent because of limited access, surrounding industrial development, and cold winter and fall weather. For an RME value, consistent with the request of NJDEP (2001), this assessment assumed 132 visits per year. This was derived by NJDEP assuming visits 5 days per week during the 13 summer weeks, and three days per week during the 26 spring and fall weeks. The central tendency scenario assumed approximately half as many visits (i.e., 65 visits per year [NJDEP 2001]).

Older children are assumed to visit OU1 areas as frequently as adults, but they have a somewhat higher exposure due to their lower body weight (i.e., 49-kg average for ages 9–18, in comparison to 70-kg average for adults). For the RME case, the HHRA assumed that adults might trespass within the area over a period of 30 years and older children might visit the area for nine years, while the central tendency exposure scenario assumed that both adults and older children may visit the West Ditch or onsite basin for a period of 9 years.

Because site groundwater is classified by the State of New Jersey as potable, a hypothetical future residential drinking water scenario is also evaluated (NJDEP 2001). In this scenario, it is assumed that water is consumed in the home 350 days per year for 30 years. Consistent with Schaum et al. (1994), the exposure duration assumed for adults was 30 years and the exposure duration for children was assumed to be 6 years. The adult body weight in this scenario is assumed to be 70 kg and the child's body weight is assumed to be 15 kg (U.S. EPA 1991).

4.3.2 Incidental Ingestion of Soils and Sediments

People visiting or working within OU1 may ingest surface soils or sediment as a result of direct contact with soil or sediment on the hands, followed by hand-to-mouth activity (either inadvertent or associated with eating or smoking). Surface soils in the undeveloped and developed areas, and sediments in the undeveloped area, were considered separately because of the differences in current and future use. As described above, sediment samples were collected in OU1 (West Ditch and the onsite basin). Appendix A Tables 4.1 and 4.2 provide exposure assumptions for trespassers' exposure to soil and sediment while Tables 4.3 and 4.4 provide exposure assumptions for long-term workers' exposure to surface soil and construction workers' exposure to subsurface soil, respectively.

Incidental ingestion of soil and sediment was evaluated using EPA guidance for risk assessment regarding soil ingestion. U.S. EPA (1997a) does not provide an upper-bound value for adults and older children. However, U.S. EPA (1991) has identified 100 mg/day as an upper-bound intake rate for adults. Therefore, this value was used as the intake rate for older children and adults in the RME trespasser scenario. For the RME long-term worker scenario, the assumption is made that half of this intake occurs at work, resulting in an RME intake for workers of 50 mg/day (U.S. EPA 1991). Consistent with EPA guidance, the mean value for adults of 50 mg/day was used in the central tendency trespasser scenario for adults and older children, and in the central tendency scenario for long-term workers (U.S. EPA 1997a). For the construction worker, the ingestion rate of 330 mg/day identified in the EPA *Draft Soil Screening Guidance* was applied as required by EPA (NJDEP 2003) in the RME case and an ingestion rate of 50 mg/day was applied in the central tendency scenarios.

4.3.3 Dermal Contact with Soils and OU1 Sediments

Appendix A Tables 4.1 through 4.4 present the exposure algorithms and all exposure assumptions used in deriving exposure estimates for dermal contact with soils and OU1 sediments. Dermal exposure was expressed as an absorbed dose by incorporating a chemical-specific dermal absorption factor into the exposure equation. Dermal absorption factors reflect the desorption of the chemical from soil and the absorption of the chemical across the skin and into the bloodstream (U.S. EPA 1997a). Dermal absorption factors are those identified by NJDEP and EPA (NJDEP 2001). Consistent with guidance from NJDEP and EPA (NJDEP 2001), where data for absorption from soil are not available, dermal exposure is evaluated qualitatively.

Surface area reflects the amount of skin exposed to a chemical in the exposure scenario. EPA does not provide surface area estimates for use in evaluating recreational scenarios. For contact with outdoor soil exposure in a residential setting, however, U.S. EPA (2001) recommends using 5,700 cm^2 for an adult in both central-tendency and upper-bound estimates. This value represents the 50th percentile of surface areas of the head, hands, forearms, and lower legs and was derived from the average of these contact areas for men and women over the age of 18. This estimate was used for adult trespassers in contact with soil or sediment.

For evaluating the older child's dermal contact with soil or sediment, a surface area of 4,000 cm^2 was derived for both central tendency and RME estimates, based on guidance from EPA and NJDEP (NJDEP 2001). Workers' dermal contact with soil was evaluated using the skin surface area recommended by U.S. EPA (2001) for workers, which is 3,300 cm^2. This is representative of the 50th percentile skin surface area for the head, hands, and forearms of males and females more than 18 years old. This surface area estimate was applied in the central tendency and RME scenarios of both the long-term worker and the construction worker.

The soil-to-skin adherence factor refers to the amount of soil that remains deposited on the skin after contact. Adherence factors vary by soil type (e.g., moisture content, particle size), by the body part contacting the soil, and by the activity being conducted while in contact with the soil. Although U.S. EPA (1997a) reports that adherence factors for sandy sediments are likely to be

less than for soils (because contact with water may wash the sediment off the skin) adherence to skin was conservatively assumed to be the same for soils and OU1 sediments in this HHRA. Adherence values identified in EPA's latest dermal guidance (U.S. EPA 2001) were applied. For the trespasser scenario, RME and central tendency adherence factors for adults were assumed to be 0.07 mg/cm^2 and 0.01 mg/cm^2, respectively. For older children, RME and central tendency adherence factors identified by U.S. EPA (2001) were applied, including 0.2 mg/cm^2 for the RME scenario and 0.04 mg/cm^2 for the central tendency scenario. For the construction worker scenario, the adherence factors of 0.2 mg/cm^2 for the RME scenario and 0.1 mg/cm^2 for the central tendency scenario were used in calculations, as recommended by NJDEP. The adherence factor of 0.2 mg/cm^2 is the highest 50th percentile factor, identified in data from utility workers. For the long-term worker, an adherence value of 0.2 mg/cm^2 was applied in the RME scenario and 0.02 mg/cm^2 was applied in the central tendency case, consistent with recommendations by NJDEP and U.S. EPA (NJDEP 2001).

4.3.4 Incidental Ingestion of Surface Water

Appendix A Tables 4.5 and 4.6 present the exposure algorithms for incidental ingestion of surface water while wading in the West Ditch or trespassing near the onsite basin. As described above, given the OU1 location, any trespassing in these areas would be expected to be minimal. For the trespasser scenario, wading was assumed to represent the greatest exposure potential, because the OU1 surface water features are an unlikely location for trespassing and are too shallow for swimming. RAGS (U.S. EPA 1989) recommends a value of 50 mL/hour as the amount of water ingested while swimming. Based on professional judgment, the HHRA assumed that 25 percent of EPA's assumed water consumption rate for swimming, or 12 mL/hour, will be consumed while trespassing near the West Ditch or onsite basin. For the RME and central tendency scenarios, it was assumed that wading occurs 1 hour/day and 0.5 hour/day, respectively, based on best professional judgment. Trespasser receptors, exposure duration, and exposure frequency are the same as noted above.

4.3.5 Dermal Contact with Surface Water

Appendix A Tables 4.5 and 4.6 also present the algorithms for calculating the absorbed dose from dermal contact with surface water in OU1. The exposure assumptions for dermal contact with water are the same as those described for dermal contact with soil. Specifically, trespassers (older children or adults) visiting these areas are assumed to submerge the surface areas of their hands, forearms, feet, and lower legs.

The permeability constant reflects the rate of movement of the chemical across the skin. Permeability constants for all the CoPCs in surface water were taken from comments provided by NJDEP (NJDEP 2001) or from U.S. EPA (2001) (i.e., from Table 3.1 for metals, or Appendix B for organic CoPCs) and are shown in Appendix A Table 4.7. All other exposure assumptions are the same as discussed above for ingestion of surface water.

4.3.6 Ingestion of and Dermal Contact with Groundwater for Workers

Appendix A Table 4.8 presents algorithms that were used to calculate exposure to CoPCs via use of OU1 groundwater as drinking water in a long-term worker scenario. As described previously, such use is highly unlikely and is considered here for risk assessment purposes only. The intake of groundwater for the RME was assumed to be 1 L/day, based on the 2-L/day total intake of drinking water identified by U.S. EPA (1997a). This assumes that half of all water intake is consumed in the workplace. Similarly, the central tendency case assumed an intake of 0.7 L/day based on half of the 1.4-L/day mean value identified by U.S. EPA (1997a). Dermal contact with drinking water at the workplace is assumed to be limited to washing hands. The surface area assumed was derived from Table 6-4 of U.S. EPA (1997a) and represents the average of the maximum values for men and women (i.e., 977 cm^2, derived from 1,130 cm^2 and 824 cm^2) in the RME case, and the average of the mean values (i.e., 793 cm^2, derived from 840 cm^2 and 746 cm^2). Because hand washing involves a very brief exposure period, a fractional intake for dermal exposure to water of 0.03 was applied to represent about two minutes of exposure per day. Exposure frequency and duration assumptions are those identified previously for long-term workers.

4.3.7 Use of Groundwater as Drinking Water for Hypothetical Future Residents

As described above, because the site groundwater is identified by the State of New Jersey as potable drinking water, site CoPCs were evaluated in a future hypothetical scenario in which water is used as domestic drinking water. In this scenario, water was used for drinking, bathing, and all other household uses. Associated pathways include:

- Consumption of drinking water by adults and children
- Dermal contact with CoPCs during bathing and showering
- Inhalation of volatile CoPCs during bathing or showering.

Exposure assumptions used in this assessment are those agreed to in conversations with EPA Region II and are consistent with U.S. EPA (1991, 1997a). In all pathways, a standard default exposure frequency of 350 days per year and duration of 30 years was applied for adults and 6 years for children.

4.3.7.1 Hypothetical Future Residential Consumption of Drinking Water

The algorithms and assumptions for ingestion and dermal contact with drinking water for adults and children are presented in Appendix A Tables 4.9 and 4.10, respectively. For adults, the assumed RME drinking water ingestion rate of 2 L/day is based on guidance in U.S. EPA (1991) and the central tendency estimate is 1.4 L/day, which is the mean for adults identified in U.S. EPA (1997a, Table 3-30). For children, the RME ingestion rate of 1.5 L/day is the 95th percentile rate for children ages 3 to 5. This value also represents the 95th percentile rate for children less than three years old. The childhood assumed central tendency ingestion rate of 0.74 L/day is a mean from U.S. EPA (1997a, Table 3-30) and represents the average of mean intakes of children less than 3 years and children 3 to 5 years.

4.3.7.2 Dermal Contact with Water During Showering or Bathing

The algorithms and assumptions for dermal contact with domestic water for adults and children during showering or bathing are presented in Tables 4.9 and 4.10 of Appendix A. Exposure terms unique to this hypothetical residential pathway include skin surface area and showering or bathing time. For adults, the assumed RME and central tendency skin surface area was 18,000 cm^2, which represents the average of the male and female average surface area identified in U.S. EPA (1997a, 2001). The RME and central tendency surface area for children of 6,600 cm^2 is based on the recommendation for estimates of a bathing or showering scenario provided in U.S. EPA (2001).

Exposure times for contact with water during showering or bathing were derived from EPA Region II (U.S. EPA 2003a) and were also based on the Andelman model. These assumptions include: RME estimates of 0.25 hours for adults and 0.45 hours for a child; and central tendency estimates of 0.10 hours for an adult at 0.14 hours for a child. One bath or shower per day is assumed.

4.3.7.3 Inhalation of Volatile CoPCs During Bathing or Showering

Consistent with a request from EPA and NJDEP (NJDEP 2001), hypothetical concentrations of CoPCs in indoor air were estimated through application of the Andelman model as modified by Schaum et al. (1994). This model was run to evaluate the concentration of volatile contaminants that might be present in indoor air during and after showering, and to estimate risks for adults and children following exposure to indoor air related to bathing or showering. Appendix C, Tables C-1 through C-7 show the methodology, the exposure assumptions, and the results of the runs of the Andelman model. EPCs for groundwater were the site-specific inputs for the model estimates.

Appendix C Tables C-1 through C-3 show the algorithm and the assumptions used in estimating air concentrations and risks in the Andelman model. Two exposure assumptions unique to this pathway were the inhalation rate during showering and the time spent in the shower and in the bathroom. The inhalation rate assumed was 20 m^3 per day for adults and children (i.e., 0.83 m^3

per hour) based on the assumptions in the Andelman model and consistent with assumptions used by EPA in deriving unit risk values for application in risk assessment. The exposure time spent in the bathroom during and after bathing or showering was based on recommendations from EPA Region II (U.S. EPA 2003d) and was also based on the Andelman model. These assumptions include: RME estimates of 0.58 hours for adults (i.e., the time in the shower [t_1] of 0.25 hours and the time after showering [t_2] of 0.33 hours) and 1 hour for a child (i.e., [t_1] of 0.45 hours and [t_2] of 0.55 hours); and central tendency estimates of 0.25 hours (i.e., [t_1] of 0.10 hours and [t_2] of 0.15 hours) for an adult at 0.33 hours for a child (i.e., [t_1] of 0.14 hours and [t_2] of 0.19 hours). One bath or shower per day is assumed.

4.3.8 Inhalation of Mercury Vapors in Outdoor Air

Consistent with the work plan, mercury vapor was the only chemical measured in outdoor air. The maximum mercury vapor concentrations exceeded the PRG, and it was identified as a CoPC. Appendix A Table 4.11 presents the algorithm used to calculate exposure to the measured concentrations of mercury vapor in outdoor air. Exposure assumptions include an inhalation rate of 3.3 m^3/hr for the RME, which is the recommended upper-percentile rate for outdoor workers, and an inhalation rate of 1.3 m^3/hr for the central tendency case, which is the mean value identified by U.S. EPA (1997a). The time spent outdoors for both the RME and central tendency cases was assumed to be an average of 2 hours per day over the course of the year, based on best professional judgment. Exposure frequency and duration are the same as those identified for the long-term worker.

4.3.9 Inhalation of CoPCs that Migrate from Soil or Groundwater to Indoor Air

Consistent with the work plan, the remedial investigation air sampling was for mercury only because mercury was a primary concern at the site. However, comments on the draft HHRA (NJDEP 2001) indicated the need for further evaluation of the vapor intrusion pathway for additional CoPCs identified in soil or groundwater. Vapor intrusion is the migration of volatile chemicals from subsurface soil and groundwater into overlying buildings. In agreement with

EPA and NJDEP, the potential for exposure to volatile CoPCs in indoor air was evaluated using the latest version (031403) of the Johnson and Ettinger model software developed by U.S. EPA (2003c). The model methodology and assumptions are briefly described here and are summarized in Appendix C Tables C-8 and C-9. The modeling results are provided in Appendix C Tables C-10 and C-11.

The Johnson and Ettinger model provides a conservative means to evaluate potential risks related to exposure to chemicals in indoor air. Some of the key modeling input parameters, such as the building air exchange rate (ER), average soil gas flow rate into the building (Q_{soil}), and the building mixing height (H_B), are determined based on the EPA *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* (U.S. EPA 2002b).

4.3.9.1 Johnson and Ettinger Methodology

The Johnson and Ettinger model is a one-dimensional analytical solution to convective and diffusive vapor transport into indoor spaces. The model provides an estimated attenuation coefficient that relates the vapor concentration in the indoor spaces to the vapor concentration at the source of contamination (e.g., subsurface soil, groundwater). The model is constructed as both a steady-state solution to vapor transport (infinite or non-diminishing source) and as a quasi-steady-state solution (finite or diminishing source). Input parameters to the model include chemical and physical properties of the modeled chemicals, saturated and unsaturated zone soil properties, and structural properties of the buildings.

Three scenarios were considered to evaluate the potential vapor intrusion pathway for future hypothetical workplaces in the developed area or in the undeveloped area including:

- Vapor intrusion from subsurface soil to indoor air was modeled at the developed area (because the average depth to groundwater was 2.7 ft, the modeling was conducted assuming a building with no basement)

- Vapor intrusion from subsurface soil to indoor air was modeled at the undeveloped area (because the average depth to groundwater was 7.7 ft, the modeling was conducted assuming a building with basement)

- Vapor intrusion from groundwater to indoor air in either area based on site-wide groundwater concentrations. Modeling was conducted assuming buildings had basements. Although the assumption of a basement within the developed area likely overestimated risks for that area, as indicated in Section 6, risk estimates for this pathway were well below thresholds typically considered to be of concern.

Input concentrations for soil and groundwater were the EPCs for subsurface soils in the developed area and undeveloped area, and the EPCs for sitewide groundwater.

4.3.9.2 Johnson and Ettinger Input Parameter Determinations

To achieve more realistic transport and fate modeling results, efforts have been made to develop site-specific parameters as part of the inputs to the Johnson and Ettinger model. These parameters include average sampling depth for subsurface soil samples and depth to groundwater tables. For the rest of the input parameters, the default values recommended by the Johnson and Ettinger model User's Guide (U.S. EPA 2003c) were used.

Following EPA Region II's recommendation, the key input parameters for the vapor intrusion modeling were selected from Appendix G of the *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* (U.S. EPA 2002b), and are summarized as follows:

- Building air exchange rate (ER): 0.25 1/hour

- Building area and subsurface foundation area (L_B and W_B): 10 ×10 m

- Building mixing height (H_B): 3.66 m for basement; 2.44 m for slab-on-grade

- Average soil vapor flow rate into the building (Q_{soil}): 5 L/min
- Floor-wall seam crack width (w): 0.1 cm.

4.3.9.3 Modeling Results

The indoor air concentrations of chemicals of concern for each of the scenarios were modeled using the latest version of EPA's Johnson-Ettinger model software, and the results for subsurface soil to indoor air and for groundwater to indoor air are summarized in Appendix C Tables C-10 and C-11, respectively. These modeling results were used in hypothetical risk estimates for workers exposed to CoPCs in indoor air.

4.3.9.4 Indoor Air Exposure Assumptions

The algorithm and exposure assumptions for estimating workers' inhalation of CoPCs in indoor air are presented in Appendix A, Table 4.12. The assumptions regarding exposure frequency and exposure duration are consistent with those for other worker exposure pathways as described above (i.e., 250 days per year for 25 years in the RME and for 6.6 years in the central tendency scenario). EPA has not published inhalation rates for indoor workers; it has, however, published rates for adults performing various levels of activities indoors (U.S. EPA 1997a, Table 5-23). The indoor inhalation rate for adults in the central tendency estimate was calculated using a rate of 1.0 m^3/hour, based on light activities, for 9 hours, for a total inhalation rate of 9 m^3/day. The RME estimate was calculated assuming 5 hours of moderate activity at an inhalation rate of 1.6 m^3/hour and 4 hours at a light activity level of 1.0 m^3/hour for a total inhalation rate of 12 m^3/day (U.S. EPA 1997a, Table 5-23).

4.4 Exposure Point Concentrations

The EPC, or the concentration term in the exposure equation, is derived to reflect a representative concentration at the exposure point or points over the exposure period (U.S. EPA 1989). In evaluating the RME exposure scenario, EPA guidance specifies the use of the upper

95th percent upper confidence limit (UCL) on the mean concentration. Consistent with guidance from EPA Region II, the UCL was applied in both the RME and in the central tendency scenarios. Where the UCL was greater than the maximum value, the maximum concentration was applied. Where a chemical was detected at least once in a dataset, the remaining undetected samples were included in the UCL using one-half of the detection limit).

To evaluate exposures to CoPCs in OU1 media, concentrations in developed and undeveloped areas and within the OU1 soils, sediments, and surface water were each calculated separately to better represent likely future uses of these areas. Moreover, as described previously, exposure to developed area soils was assessed separately for the current and the future scenarios, to reflect current exposure to unpaved soil and future exposure to all surface soil, including soils now under pavement.

As part of data analyses conducted during the HHRA, data in each affected environmental medium were evaluated. For data sets with fewer than ten sample results, the maximum concentration was used as the EPC for both the RME and central tendency case. Where data sets were larger than or equal to ten sample results, the data distributions were statistically tested for lognormality and normality using the Shapiro-Wilk goodness-of-fit test. Data sets with more than 50 sample results were tested using the Shapiro-Francia goodness-of-fit test. Data sets were identified as best fitting a lognormal or normal distribution, or not fitting either.

In cases where a normal distribution fit the data, the 95 percent UCL was calculated using the Student's t-statistic method. In cases where a lognormal distribution fit the data, a 95 percent UCL was calculated using Land's H-statistic method or Chebyshev inequality (minimum variance unbiased estimate) method, dependent on the sample size and standard deviation of the log-transformed data. For small sample sizes with large log-transformed standard deviations, the 99 percent UCL using Chebyshev inequality was used to provide adequate coverage of the mean. The choice of which method to use was decided in accordance with U.S. EPA (2002a). Consistent with U.S. EPA (2002a), a non-parametric calculation method was used where data sets were not lognormal or normal. For sample sizes greater than 100, the adjusted Central Limit Theorem method was used, otherwise Hall's bootstrap-t method, accounting for bias and skewness, was used (Schulz and Griffin 1999).

Results of the calculation of the EPCs used in the HHRA are presented in Appendix A Tables 3.1 through 3.13.

As recommended in RAGS, the 95 percent UCL of the arithmetic mean was used in estimating exposure concentrations for the RME scenarios because of the uncertainty associated with estimating the central tendency exposure concentration. Using the UCL on the mean concentration is a conservative method for evaluating exposure and risks.

Appendix A includes summaries of OU1 data and EPCs. As described above, two samples were identified with mercury concentrations much higher than remaining values, SS-04 in the developed area and HS-05 in the undeveloped area (see Table 4-1 of the main text). The maximum mercury value in the developed area (all soils) was 13,800 mg/kg, which is much higher than the next highest concentration (2,250 mg/kg). This was identified as a hot spot and the UCL was recalculated without this value. The resulting UCL was higher than the next highest concentration of 2,250 mg/kg and this value was used in risk calculations. In addition, in the undeveloped area, Sample HS-5, a hazardous waste sample, had a concentration of 295,000 mg/kg and was also identified as a hot spot. Recalculation of the UCL without this value resulted in an EPC of 507 mg/kg, which was used in risk estimates for surface soil in the undeveloped area. The uncertainty assessment includes calculations with these values included.

Similarly, for lead, there was a concentration of 47,600 mg/kg identified in hazardous waste sample HS-6, which was identified as a hot spot. The UCL calculated with this value was 2,286 mg/kg, and as 1,174 mg/kg without sample HS-6.

5 Toxicity Assessment

The purpose of a toxicity assessment is to evaluate the potential for CoPCs to cause adverse health effects in exposed persons and to thoroughly define the relationship between the extent of exposure to a hazardous chemical and the likelihood and severity of any adverse health effects. The standard procedure for a toxicity assessment is to identify toxicity values for carcinogenic and noncarcinogenic effects and to summarize other relevant toxicity information. This section describes the methods used to evaluate toxicity that could result following oral, dermal, or inhalation exposure to CoPCs, and provides a brief toxicity profile for inorganic mercury, which was a key CoPC in this risk assessment. Section 6.3, *Uncertainty Assessment*, also discusses uncertainties in EPA's toxicity value for inorganic mercury.

EPA-derived toxicity values used in risk assessments are termed cancer slope factors (CSFs) and reference doses (RfDs). CSFs are used to estimate the incremental lifetime risk of developing cancer corresponding to CDIs calculated in the exposure assessment. The central tendency potential for noncarcinogenic health effects is evaluated by comparing estimated daily intakes to RfDs, which represent daily intakes at which no adverse effects are expected to occur over a lifetime of exposure. Both CSFs and RfDs are specific to the route of exposure (e.g., ingestion [oral] exposure). Currently, no CSFs or RfDs exist for dermal exposure; therefore, oral absorption factors were used to adjust CSFs and RfDs to assess dermal exposure, as described in the subsection below. For inhalation, unit risk factors for carcinogens and reference concentrations for noncarcinogenic effects were applied. In some cases, where unit risk values and reference concentrations were not available, oral toxicity values were used through route conversions as applied by EPA Region IX in the spreadsheet presenting PRGs (U.S. EPA 2003a). Although this method was applied in order to evaluate all chemicals possible in the inhalation pathways, there is some uncertainty related to this approach and the assumption that inhalation risks are equivalent with oral risks may overestimate risks for some chemicals.

As indicated in RAGS (U.S. EPA 1989), the primary source for EPA-derived toxicity values is EPA's Integrated Risk Information System (IRIS) (U.S. EPA 2003b). This computerized

database contains peer reviewed toxicity values in addition to up-to-date health risk and EPA regulatory information for many chemicals commonly detected at hazardous waste sites. EPA extensively reviews and peer-reviews RfDs and CSFs derived for risk assessment, and once they are finalized and posted in IRIS (U.S. EPA 2003b), they represent agency consensus. EPA's *Health Effects Assessment Summary Tables* (HEAST; U.S. EPA 1997b), and the EPA National Center for Environmental Assessment (NCEA) (http://cfpub.epa.gov/ncea/) also provide EPA-derived toxicity values that may or may not be verified at the time of publication. In this assessment, toxicity values were selected using the following hierarchy: IRIS values, HEAST values, and/or NCEA values. In addition, as described above, inhalation toxicity values identified in the EPA Region IX PRG spreadsheets (U.S. EPA 2003a) were also applied where no other toxicity values were available. Appendix A Tables 5.1 and 5.2 show the toxicity values used in this risk assessment to assess noncarcinogenic effects related to oral and inhalation exposures, respectively, and Appendix A Tables 6.1. and 6.2 present toxicity values for carcinogenic CoPCs for oral and inhalation exposures, respectively.

5.1 Toxicity Assessment for Dermal Exposure

As noted previously, EPA has not developed any toxicity values for dermal exposure. EPA suggests, however, that dermal toxicity values can be derived from oral toxicity values for substances with systemic effects that are not dependent on route of administration (U.S. EPA 1989). In deriving such values, consistency is required between the type of dose that forms the basis of the oral toxicity value and the type of dose that will be calculated by the dermal exposure models. Specifically, a distinction must be made between an administered dose or intake (i.e., the amount of chemical taken into the body) and the absorbed dose (i.e., the amount of chemical that crosses body membranes and enters the blood stream).

Typically, oral toxicity values and CDIs for oral exposure are based on administered doses (or intakes); therefore, usually no adjustments are necessary to calculate risk estimates for oral exposures. However, because dermal exposures are usually expressed in terms of absorbed doses, dermal toxicity values must also be based on absorbed, rather than administered, doses (U.S. EPA 2001). To derive a dermal toxicity value for absorbed dose from an oral toxicity

value based on administered dose, the oral toxicity value is adjusted by an estimate of the fractional oral absorption (i.e., the oral absorption factor). A CSF is divided by the oral absorption factor, and an RfD is multiplied by the oral absorption factor to calculate the adjusted toxicity value.

U.S. EPA (2001) reviewed data on oral absorption of many chemicals and recommends adjustment factors for an oral slope factor/RfD, used to estimate dermal toxicity values. These adjustments are described in Appendix A, Tables 5.1 and 6.1 and were applied in estimates of dermal exposure to CoPCs in soil or water.

Dermal absorption from soil and from water is also a chemical-specific variable. For evaluation of soil and sediments, the recent EPA dermal risk assessment guidance provides chemical-specific dermal absorption values for several site CoPCs including arsenic, cadmium, PAHs, and PCBs. These chemicals were evaluated in the dermal exposure pathways for soil and sediments. Consistent with EPA guidance, remaining site CoPCs that have no identified absorption factors from soil or sediments were addressed qualitatively in the dermal assessment.

Estimation of dermal absorption from water requires application of a permeability constant, which was also identified by U.S. EPA (2001) and in comments from NJDEP (2001). Consistent with both of these guidance documents, where no permeability constant was available, the chemical was not evaluated in the dermal exposure pathway.

Appendix A Tables 5.1 and 6.1 provide the oral absorption factors and adjusted toxicity values used for relevant CoPCs in this risk assessment.

5.2 Toxicity Profiles

Toxicity profiles provided by EPA in the IRIS database were referred to in preparing this assessment. These profiles can be accessed through the EPA web site (www.epa.gov/iris/subst/index.html). This section provides a brief summary of the EPA toxicity value for inorganic mercury (mercuric chloride), which is one of the main contributors to OU1 risk estimates.

Estimates of potential risks associated with inorganic mercury are based on EPA's current RfD of 0.0003 mg/kg-day, which is based on feeding and injection studies in rats. The RfD was derived by applying an uncertainty factor of 1,000 to the lowest-observed-adverse-effect level identified from three studies. The primary adverse effect in these studies, identified at higher concentrations, was an autoimmune effect on the kidney. EPA indicated that no one study was sufficient to derive a toxicity value for inorganic mercury. Specifically, there was no chronic oral study to apply as the basis for the RfD, and consequently, the RfD was based on a combination of studies conducted in a shorter time frame (subchronic studies) using both the oral and subcutaneous routes. EPA applied an uncertainty factor of 1,000 to the lowest-adverse-effect level to account for the use of a subchronic study and the availability of a lowest-adverse-effect level (as opposed to a no-adverse-effect level), and to account for the relative increased sensitivity of human populations. The uncertainty assessment discusses uncertainties related to the application of this RfD in the risk assessment to evaluate chronic human exposure resulting from oral contact with mercury.

6 Risk Characterization

In risk characterization, quantitative exposure estimates and toxicity factors are combined to calculate numerical estimates of potential health risk. In this section, potential cancer and noncancer health risks are estimated assuming long-term exposure to CoPCs detected in OU1 media. As described in Section 4, *Exposure Assessment*, potential risks are estimated for the future worker and trespasser scenarios to provide a conservative means of considering possible future uses. The risk characterization methods described in RAGS (U.S. EPA 1989) are used to calculate potential RME and central tendency excess lifetime cancer risks for carcinogens, and hazard indices for CoPCs with noncancer health effects. These methods and the results of the risk characterization are described below. Tables 6-1 and 6-2 show excess cancer risk estimates for the RME and central tendency scenarios, while Table 6-3 and 6-4 present RME and central tendency hazard indices. In addition, tables in Appendix A present detailed results of the risk calculations for each exposure pathway, including EPCs and CDIs calculated for the RME and central tendency scenarios, toxicity values used in risk estimates, and potential risk estimates for each CoPC in each exposure pathway.

6.1 Carcinogens

6.1.1 Methods

Quantifying total excess cancer risk requires calculating risks associated with exposure to individual carcinogens and aggregating risks associated with simultaneous exposure to multiple carcinogenic CoPCs. A cancer risk estimate for a single carcinogen is calculated by multiplying the carcinogenic CDI of the CoPC by its slope factor. A 1×10^{-6} cancer risk represents a one-in-one-million additional probability that an individual may develop cancer over a 70-year lifetime as a result of the exposure conditions evaluated. Because cancer risks are assumed to be additive, risks associated with simultaneous exposure to more than one carcinogen in a given medium are aggregated to determine a total cancer risk for each exposure pathway. Total

cancer risks for each pathway are then summed for reasonable combinations of exposure pathways, to determine the total cancer risk for the population of concern.

The likelihood that actual risks are greater than estimated risks is very low because of the conservative assumptions used to develop cancer risk estimates; in fact, actual risks may be significantly less than predicted values. EPA's *Guidelines for Cancer Risk Assessment* states, "...the linearized multistage procedure (typically used to calculate CSFs) leads to a plausible upper limit to the risk that is consistent with proposed mechanisms of carcinogenesis...The true value of the risk is unknown, and may be as low as zero" (51 Fed. Reg. 185:33992, 33998 [1986]).

Although the determination of an acceptable risk level is ultimately a decision to be made by risk managers, the findings presented here are compared with the range of acceptable risk levels cited in EPA's NCP (U.S. EPA 1990b), which EPA describes as the "blueprint for the Superfund law." The NCP states that risk levels in the range of 10^{-4} to 10^{-6} and lower are considered to be within the range of acceptable risks for Superfund sites. For perspective on background cancer risks, the lifetime risk of developing cancer in the U.S. population is approximately one in two (i.e., 5×10^{-1}) for men and approximately one in three (i.e., 3×10^{-1}) for women (American Cancer Society 1998).

6.1.2 Quantification of Carcinogenic Risks

Carcinogenic risk estimates were calculated for older children and adults in the RME and central tendency scenarios as the probability of additional cancers associated with the exposure pathways evaluated. Appendix A, Tables 7.1.RME through 7.21.RME provide carcinogenic risk estimates for the RME scenario, Tables 7.1.Central Tendency through 7.21.Central Tendency, provide carcinogenic risk estimates for the central tendency scenario and these values are further summarized for each receptor in Appendix A Tables 9.1.RME through 9.9.RME and Appendix A Tables 9.1.Central Tendency through 9.9.Central Tendency. In addition, Table 6-1 provides risk estimates for CoPCs in the RME scenario, and Table 6-2 provides a summary of risk estimates for all complete exposure pathways in the central tendency scenario. These tables

also provide a summary of CoPCs that account for primary contribution of the risk estimates in each pathway. Appendix A Tables 10.1 through 10.7 provide estimates for chemicals in pathways with RME cancer risk estimates greater than 1×10^{-6} or hazard indices greater than 1. Estimated total cancer risks for both RME and central tendency scenarios were within the 10^{-6} to 10^{-4} target risk range identified above, with one exception. The future hypothetical residential use of drinking water had a risk estimate of 2×10^{-4} (i.e., with ingestion, inhalation, and dermal contact combined). The next highest risk estimate for a receptor was the combined estimate of 7×10^{-5} for the worker in the undeveloped area, or in the developed area, primarily related to hypothetical consumption of groundwater, ingestion and dermal contact with soil, and inhalation of volatile constituents in indoor air. Risk estimates for ingestion of groundwater were primarily related to arsenic in groundwater, estimates for soil were primarily related to arsenic and PAHs in the developed area and arsenic, PAHs, and PCBs in the undeveloped area, and indoor air risk estimates were primarily related to estimated concentrations of benzene for indoor air in the developed area and benzene and benzo[a]pyrene in the undeveloped area.

Trespassers on the undeveloped area had a total risk estimate of 2×10^{-5} for ingestion and dermal contact with soils and the total estimate for the hypothetical trespassers within the West Ditch or the onsite basin was 1×10^{-5}. Risks for this scenario were also related primarily to arsenic and PAHs in soil and sediments. There were no carcinogenic CoPCs in surface water and thus no risk estimates. All risk estimates for the construction workers' contact with soil were below 1×10^{-6}.

As discussed further in the Uncertainty Assessment, risks associated with arsenic can be considered in light of the fact that, while site-specific data were not available, OU1 soil arsenic concentrations were similar to those in background soils in suburban locations in New Jersey. Similarly, risk estimates related to use of groundwater as drinking water should be considered hypothetical, given that such use is highly unlikely.

6.2 Noncarcinogens

6.2.1 Methods

Unlike carcinogenic effects, other potential adverse health effects are not expressed as a probability. Instead, these effects are expressed as the ratio of the estimated exposure over a specified period to the RfD derived for a similar exposure period (e.g., CDI:chronic RfD). This ratio is termed a hazard quotient. If the CDI exceeds the RfD (i.e., hazard quotient greater than 1), there may be concern for noncancer adverse health effects. Exposures resulting in a hazard quotient less than or equal to 1 are very unlikely to result in noncancer adverse health effects. Because EPA states that the range of possible values around RfDs is "perhaps an order of magnitude" (Dourson 1993), the significance of intakes exceeding the RfD by one-half an order of magnitude or less (i.e., hazard indices less than 5) must be considered carefully (see Section 6.3.1). In initial risk calculations, hazard quotients for individual CoPCs are summed for each exposure pathway to derive a hazard index. Hazard indices for each exposure pathway are then summed to determine the total hazard index for each population of concern.

6.2.2 Quantification of Noncarcinogenic Risks

Appendix A, Tables 8.1.RME through 8.21.RME provide hazard indices for all chemicals in all pathways and Tables 8.1.Central Tendency through 8.21.Central Tendency provide hazard indices for all chemicals in all pathways. Appendix A, Tables 9.1.RME through 9.9.RME and 9.1.Central Tendency through 9.9.Central Tendency provide further summaries, and Appendix A Tables 10.1 through 10.7 provide estimates for chemicals in pathways with RME cancer risk estimates greater than 1×10^{-6} or hazard indices greater than 1. Tables 6-3 and 6-4 summarize total hazard indices calculated for RME and central tendency scenarios, respectively. These tables also show the CoPCs with primary input into the hazard index for each pathway. For the current scenario, the adult and older child trespasser/visitor scenarios had hazard indices greater than 1 for exposure to soil and to sediments in the undeveloped area, primarily related to mercury in soil. No other current exposure scenarios had hazard indices greater than one. In the future scenarios, the exposure estimates and risks were assumed to remain the same for

trespassers. For long-term workers the future hazard index was 3.8 for exposures to surface soil (almost entirely related to mercury) and 2.0 for assumed consumption of groundwater as workplace drinking water (related to multiple chemicals including arsenic, iron, manganese, and mercury). The highest estimate was 3.8 for ingestion of surface soil in the developed area, and was based almost entirely on mercury in soil. Exposure estimates derived including the single highest value of 13,800 mg/kg at SS-04 in the developed area are provided in the uncertainty assessment. Mercury in soil was also the primary contributor to a hazard index of 1.4 for a long-term worker's exposure to surface soil in the undeveloped area. In the future trespasser scenarios, hazard indices were also greater than 1 for exposure to soil and sediment, also primarily related to mercury.

The hypothetical future use of groundwater as drinking water had the highest hazard indices in the assessment, with all hazard indices greater than one and a maximum estimate of 39 in the child scenario with a hazard index of 19 related to inhalation of volatile constituents while bathing, and 19 related to consumption of groundwater. The inhalation hazard indices were primarily related to naphthalene and the drinking water hazard indices were related to multiple chemicals including mercury (hazard index of 2.7), manganese (hazard index of 3.8), iron (hazard index of 4.9), arsenic (hazard index of 2.5), and thallium (hazard index of 3.5).

Hazard indices were less than one for outdoor air, for all indoor air pathways except in the residential scenario, and for construction workers.

There is no toxicity value for lead. The criterion used to identify lead as a CoPC in surface water is the national primary drinking water standard of 15 μg/L. Lead was identified as a CoPC because the maximum detected concentration of lead in surface water, 19 μg/L, exceeds this drinking water standard. While this value exceeds the drinking water standard, the estimated intake of water from these ditches (approximately 12 mL/day for up to 14 days per year) is several orders of magnitude less than intake from a drinking water source (i.e., 2 L per day, each day). Thus, intake and potential risks associated with ingestion of lead from the ditches are negligible.

Because inputs into the EPA lead models are based on average values, lead in soils was evaluated based on average concentrations in site media. Lead was present in soil at concentrations greater than the 1,000-mg/kg cleanup level identified by EPA for nonresidential sites in surface and subsurface soils in the undeveloped area. However, the EPC for lead of 2,286 mg/kg (including the single high concentration of 47,600 mg/kg) or of 1,174 mg/kg (excluding that value) in the undeveloped area surface soil was not substantially higher than the 1,000-mg/kg threshold. For subsurface soil in the undeveloped area, the EPC of 2,110 mg/kg is about 2 times higher than the level identified by U.S. EPA (1993). However, exposure to subsurface soils would be expected to occur for limited periods of time and infrequently, suggesting that hazards associated with lead at this location are minimal. In addition, there are some highly elevated concentrations of lead in subsurface soil in the undeveloped area, including a maximum concentration of 58,200 mg/kg detected at the 3-ft depth in sample TR0007. However, this concentration is much higher than remaining subsurface concentrations and is included in the EPC for subsurface soil in the undeveloped area.

6.3 Uncertainty Assessment

Because risk characterization serves as a bridge between risk assessment and risk management, it is important that major assumptions, scientific judgments, and estimates of uncertainties be described in the assessment. Risk assessment methods are designed to be conservative to address the uncertainties associated with each step in the risk assessment process. Thus, "true" site risks are likely to be less than risks estimated using standard risk assessment methods.

Key factors in risk assessment methods that are likely to result in underestimates or overestimates of potential site risks include the following:

- Scenarios regarding future site use are estimates and may reflect higher or lower exposures than actual use patterns.
  - In particular, future use of groundwater as drinking water is highly unlikely, given the availability of other water sources

  - Trespassing is also highly unlikely, given the site location and conditions.

- Dermal exposure to chemicals in soil and sediments was evaluated for only a subset of chemicals where absorption data were adequate. Exclusion of other chemicals is likely to underestimate risks somewhat.

- Site-specific data on background concentrations of metals in soil, sediment, and water were not available. Site-related risks may have been overestimated if these metals were also present in background media at similar concentrations.

- Use of EPA's CSFs for carcinogens, which are based on the assumption that any exposure to a carcinogen is associated with some risk of cancer, is likely to overestimate risks.

- Use of studies conducted in animals dosed at high levels to derive toxicity values may overestimate risks in human populations exposed at much lower levels.

The following sections provide more discussion regarding the potential for uncertainties related to toxicity value exposure assumptions to result in overestimates or underestimates of risk.

6.3.1 Uncertainties Related to Toxicity Values

EPA has stated in its guidelines for cancer risk assessment, "...the linearized multistage procedure leads to a plausible upper limit to the risk that is consistent with proposed mechanisms of carcinogenesis...The true value of the risk is unknown, and may be as low as zero" (51 Fed. Reg. 185:33992, 33998 [1986]). As a result, actual site risks related to exposures to carcinogens in site media are unlikely to be underestimated, and are likely to be substantially overestimated by the procedures applied in this risk assessment. However, given uncertainties regarding individual exposure patterns and sensitivities, actual risk for an individual may be higher or lower than the calculated estimate.

For evaluating noncarcinogenic risks, EPA states in IRIS that the range of possible values around RfDs is "perhaps an order of magnitude" (U.S. EPA 2003b). EPA staff (Dourson 1993) have expanded on this concept by noting that the range varies for different RfDs, depending on the uncertainty factors used (the greater the uncertainty factor, the greater the possible range). This means, in general, that environmental exposures falling into the range of the RfD cannot be distinguished scientifically from the RfD itself. That is, if a CoPC has an RfD of 1 mg/kg-day, the range of true no-effect values might be 0.3–3 mg/kg-day, indicating a combined span of about one-half an order of magnitude above and below the RfD (Dourson 1993). EPA staff have further noted (Woodruff 1989, pers. comm.) that, although they are generally concerned if intakes exceed the RfD by one-half order of magnitude, the magnitude of the uncertainty factors in the RfD must be considered in evaluating the significance of any exceedance of the RfD. For example, fluoride has an uncertainty factor of 1; thus, a regulator might be concerned about any exceedance of the RfD. On the other hand, for CoPCs with very large uncertainty factors (e.g., 1,000), exceedances of 5-fold or more may not be of concern.

This statement is particularly relevant for risk estimates related to inorganic mercury here, which are based on an RfD derived by EPA through application of an uncertainty factor of 1,000. As noted previously, the RfD for mercury applied here in hazard estimates for soil was derived from a data set that was limited. Specifically, EPA noted that there were no chronic oral studies available to derive an RfD and, as a result, EPA applied a 1,000-fold uncertainty factor. This effectively means that adverse effects were seen in animals at a dose level 1000 times higher than the RfD, which is assumed to be the safe concentration. The hazard quotient of 3.8 for mercury in soil should be considered in light of the large margin between the dose potentially causing adverse effects and the RfD.

6.3.2 Influence of Background Arsenic Concentrations

Regarding the cancer risk estimate for arsenic in soil, the contribution from naturally occurring background sources of arsenic in soil should be considered in evaluating the risk estimates. Although site-specific background data are not available, background data for the state of New

Jersey suggest that the arsenic concentrations in OU1 soils may not differ from those that would be found associated with soils that have no known source of arsenic (i.e., background locations).

As is indicated in Table 6-5, the OU1 soil arsenic concentrations are either within or similar to the range of concentrations identified as background within New Jersey soils. Therefore, risks related to exposure to arsenic in OU1 soil may be similar to those for locations with naturally occurring arsenic in soils.

6.3.3 Influence of Regional Mercury Sources on Ambient Air Concentrations

Multiple sources contribute to mercury concentrations in ambient air. The New Jersey Division of Science, Research, and Technology of NJDEP has summarized information on mercury in New Jerseys environment in a chapter entitled *Chapter 7—Occurrence and Impact of Mercury in NJ's Environmental Media* (www.state.nj.us/dep/dsr/vol2-chapter7.pdf). According to the chapter, both natural and anthropogenic sources contribute to mercury in New Jersey. One investigation cited in the chapter indicated that 67 percent of environmental mercury in New Jersey comes from regional and global sources, with the remainder from instate sources. Regarding mercury concentrations in air, the chapter noted that mercury in ambient air generally ranges from 1 to 6 ng/m^3, based on several studies around the world. While no representative data for New Jersey were identified in the chapter, a national background concentration for elemental mercury in air of 1.6 ng/m^3 was noted, based on the *Report to Congress* (U.S. EPA 1997c). Although site-specific inputs may clearly be the dominant source at a given location, all locations are subject to some regional and global input.

6.3.4 Exclusion of "Hot Spot" Mercury Concentration

As described in Section 4 and shown in Table 4.1, two samples were identified with mercury concentrations much higher than remaining values, SS-04 in the developed area and HS-05 in the undeveloped area (see Table 4-1). The maximum mercury value in the developed area (all soils) was 13,800 mg/kg, which is much higher than the next highest concentration

(2,250 mg/kg). This was identified as a hot spot and the UCL was recalculated without this value. The resulting UCL was higher than the next highest concentration of 2,250 mg/kg and this value was used in risk calculations. If the single highest value of 13,800 mg/kg were to be applied as the EPC for surface soils in the developed area, the hazard index would be 22.5, in contrast to the hazard index of 3.7 derived through application of the EPC of 2,250 mg/kg.

In addition, in the undeveloped area, Sample HS-5, a hazardous waste sample, had a concentration of 295,000 mg/kg and was also identified as a hot spot. Recalculation of the UCL without this value resulted in an EPC of 507 mg/kg, which was used in risk estimates for surface soil in the undeveloped area. Calculation of a hazard index using the UCL of 7,332 mg/kg derived including this hot spot value would result in a hazard index of 12.3 for workers in the undeveloped area in place of the estimate of 0.83 for mercury derived through application of the 507 mg/kg value (Appendix A, Table 7.9.RME). However, the high degree of influence on the UCL from the single sample likely results in an overestimate of long-term exposure and risk.

6.3.5 Uncertainties Related to Modeling

As described above, health protective assumptions were applied in modeling conducted for indoor air. In particular, the assumption that groundwater would be used as a drinking water source for workers or for residents is highly unlikely and provides risk estimates that are not currently applicable at the site. Moreover, modeling of indoor air concentrations related to domestic use of groundwater is also highly health protective and is likely to overestimate health risks even if such an unlikely scenario were to occur. In the case of Johnson and Ettinger modeling conducted to evaluate indoor air concentrations related to volatilization from soil or groundwater, aspects of this modeling are also likely to overestimate risks. For example, the modeling was conducted including an assumption that future buildings in the undeveloped area will have basements. In contrast, plans in place at this time do not include buildings with basements. The basement scenario in the model results in a higher air concentration estimate. For example, for xylene, modeling conducted assuming a basement results in an estimated concentration of 40.3 $\mu g/m^3$, while modeling assuming no basement results in an estimate of 23.8 $\mu g/m^3$ concentration. Other chemicals would have similarly reduced concentrations in

modeling applications assuming a slab construction. This would result in lower risk estimates for this pathway.

7 Conclusions

On behalf of Rohm and Haas Company, Exponent prepared a HHRA for OU1 of the site located in Wood-Ridge and Carlstadt, New Jersey. The objective of the baseline HHRA was to quantify human health risks associated with CoPCs within OU1 in the absence of any action to control or mitigate those CoPCs (i.e., under the no-action alternative). The HHRA focused on current and hypothetical future conditions that assumed use of both the undeveloped and the developed areas as workplaces in the future. Potential risk estimates for carcinogens were compared to the range of target excess risk levels (1×10^{-6} to 1×10^{-4}) identified by EPA in the NCP. Potential risk estimates for noncarcinogens were compared with a hazard index of 1. Exposure assumptions and toxicity values used in this HHRA reflect the inherently conservative nature of risk assessments conducted for regulatory purposes.

Intakes of CoPCs were estimated using algorithms and assumptions consistent with EPA guidance (e.g., U.S. EPA 1989). The following exposure pathways were evaluated:

- **Surface soils in the developed area**—Incidental ingestion, and dermal contact with CoPCs by long-term workers and construction workers
- **Surface soils in the undeveloped area**—Incidental ingestion, dermal contact with CoPCs by long-term workers, construction workers, and trespassers who might visit OU1
- **Subsurface soils in the developed and undeveloped areas**—Ingestion and dermal contact with CoPCs in subsurface soils by construction workers
- **Surface water and sediments in OU1**—Incidental ingestion and dermal contact with surface water and sediments by an adult or older child trespasser who might contact CoPCs in the onsite basin and the West Ditch
- **Groundwater**—Ingestion and dermal contact of CoPCs in groundwater by long-term workers and residents who use groundwater for drinking water

- **Outdoor air**—Inhalation of mercury vapor in outdoor air by long-term workers in the developed or undeveloped area
- **Indoor air CoPCs migrating from subsurface soil or groundwater**—Inhalation of volatile contaminants in indoor air by long-term workers in the developed or undeveloped area
- **Indoor air CoPCs migrating from domestic groundwater**—Inhalation of volatile contaminants in indoor air during and after showering or bathing by residents who use groundwater for domestic drinking water.

These scenarios are hypothetical. In particular, use of OU1 groundwater as drinking water is highly unlikely, given the availability of other drinking water sources. Development of the undeveloped area for workplace use would require fill in many areas, so direct exposure to soil is not likely to occur. Trespassers entering the site are considered unlikely, given the site location and access restrictions, the current conditions, and anticipated future site use. In addition to consideration of hypothetical exposure pathways, conservative assumptions regarding exposure and toxicity were used to calculate potential risk estimates.

Estimated total cancer risks for both RME and central tendency scenarios were within the 10^{-6} to 10^{-4} target risk range identified above, with one exception. The future hypothetical residential use of drinking water had a risk estimate of 2×10^{-4} (i.e., with ingestion, inhalation, and dermal contact combined).

Specific results for each scenario were as follows:

For the developed area:

- Under current conditions in the developed area, the long-term worker had a total risk estimate of 2×10^{-5}, resulting primarily from estimated concentrations of benzene in indoor air (from soil), and arsenic and PAHs in soil.

- Under hypothetical future conditions in the developed area, the long-term worker scenario had a total risk estimate of 7×10^{-5}, including the risk estimates identified above related to indoor air and soil exposures. This estimate for the future worker in the developed area also had assumed exposure to CoPCs through consumption of groundwater as drinking water, which had a risk estimate of 4×10^{-5}, primarily related to arsenic in water.

For the undeveloped area:

- Under hypothetical future conditions in the undeveloped area, the RME risk estimate for a long-term worker's ingestion of surface soil was 1×10^{-5}, and dermal contact with soil was 1×10^{-5}, both related primarily to arsenic, PAHs, and PCBs. In addition, the risk estimate for consumption of groundwater was 4×10^{-5}, related primarily to arsenic and benzene in groundwater, for a (rounded) total risk estimate for long-term workers of 7×10^{-5}.

- The highest risk estimates for current or future trespassers to the undeveloped area were 2×10^{-5}, for ingestion of and dermal contact with soils. The highest total risk estimate for trespassers' exposure to sediments in the West Ditch or the onsite basin was 1×10^{-5}. Risks for the trespasser scenarios were also related primarily to arsenic, PAHs, and PCBs in soil and sediments.

- There were no carcinogenic CoPCs in surface water.

For the developed and undeveloped area:

- All risk estimates for the construction workers were below 1×10^{-6}, indicating that potential risks related to human contact with subsurface soils are well within acceptable levels identified by EPA.

Hypothetical residential use of drinking water:

- The highest risk estimate for the hypothetical residential use of drinking water scenario was 2×10^{-4}, primarily related to arsenic in drinking water, with some contribution from benzene and 1,4-dichlorobenzene volatilized during showering or bathing.

7.1 Noncancer Risk Estimates

For noncarcinogens, in current scenarios, only current trespasser exposure scenarios in the undeveloped area had hazard indices greater than 1. These ranged from 1.3 to 3.5 and were primarily related to mercury in soil and sediment. In the future scenarios, the long-term worker, the adult and child trespasser scenarios, and the hypothetical residential use of groundwater all had hazard indices greater than the threshold of 1.

Results for the future scenarios for the long-term worker were as follows:

- The highest estimated hazard index was 3.8 for ingestion of surface soil in the developed area, based almost entirely on mercury in soil. If the single highest soil concentration of 13,800 mg/kg at SS-04 were to be applied as the EPC for surface soils in the developed area, the hazard index would be 22.5.
- Mercury in soil was also the primary contributor to a hazard index of 1.4 for long-term worker's exposure to surface soil in the undeveloped area.
- Future hypothetical workplace ingestion of groundwater site-wide had a hazard index of 2.0 based on mercury, manganese, arsenic, thallium, and iron.
- The total hazard indices for future long-term workers in the developed and undeveloped areas were 6.1 and 4.1, respectively, related to mercury in soils and mercury and other metals in water.

The future trespasser scenarios were assumed to be the same as the current scenarios described above and so the hazard indices are the same as those described for the current scenario.

Finally, the hypothetical residential use of drinking water scenario had total hazard indices of 12 for adults and 39 for children. In each scenario, approximately half of the total hazard index was related to ingestion of groundwater and half of the estimate was related to inhalation of volatile CoPCs during showering or bathing. The groundwater consumption estimates were related to iron, manganese, thallium, mercury, and arsenic, while the inhalation estimates were related to primarily to naphthalene with some contribution from 4-methylphenol (evaluated as phenol), benzene, and xylenes.

Although the risk and hazard estimates for several hypothetical pathways exceeded the acceptable target range identified by EPA, these findings should be considered within the context of the uncertainties related to the estimation methods. Mercury and arsenic were responsible for the majority of site risks. The potential for overestimation of OU1 risks related to exposure assumptions and to the toxicity value for mercury derived through application of a 1,000-fold uncertainty factor, suggests that risks may be lower than the RME estimates provided here. Furthermore, EPA indicates that the range of possible values around RfDs such as that used to evaluate inorganic mercury is "perhaps an order of magnitude." The hazard quotients estimated here for mercury in soil should be considered in this light.

In addition, although site-specific background concentrations were not available, concentrations of arsenic in OU1 soil were similar to those identified in background locations in suburban New Jersey. Thus, risks related to arsenic in OU1 soil would not be expected to differ substantially from estimates derived for typical background locations. Moreover, many of the potential exposure pathways considered here are entirely hypothetical. In particular, use of groundwater as drinking water is highly unlikely and is considered here only for risk assessment purposes.

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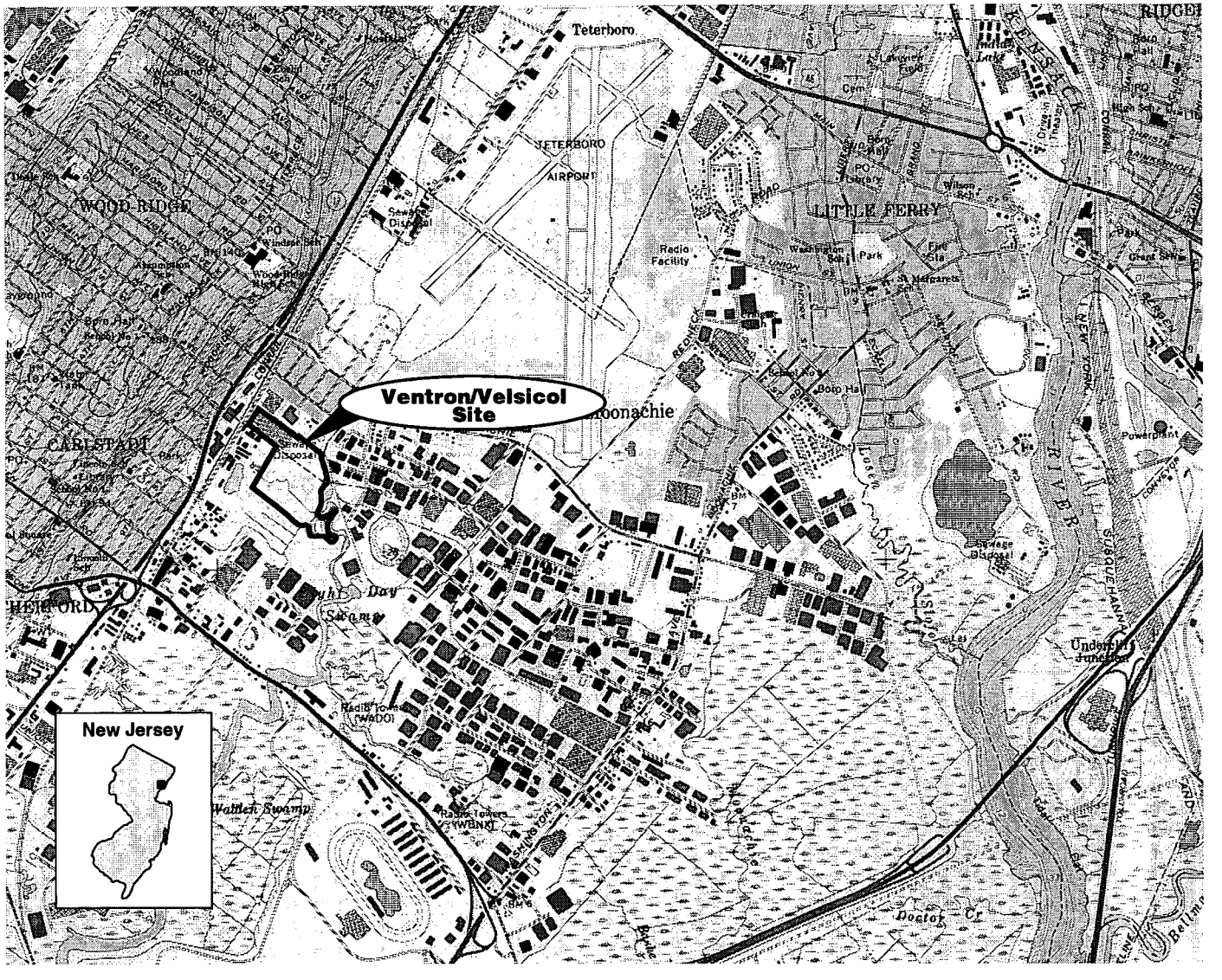
Figures



Base map source: USGS Weehawken, NJ-NY quadrangle

Figure 1-1. Site location map.

Photograph source: James Stewart, Inc. (November 29, 1997)

LEGEND

1. Diamond Shamrock/Henkel ditch (north)
2. Nevertouch Creek
3. Diamond Shamrock/Henkel ditch (south)
4. Tide gate
5. Berry's Creek
6. Railroad bridge
7. Former POTW
8. Ethel Boulevard
9. Wolf warehouse
10. U.S. Life warehouse
11. Randolph Products
12. Diamond Shamrock/Henkel Property
13. Park Place East
14. West ditch

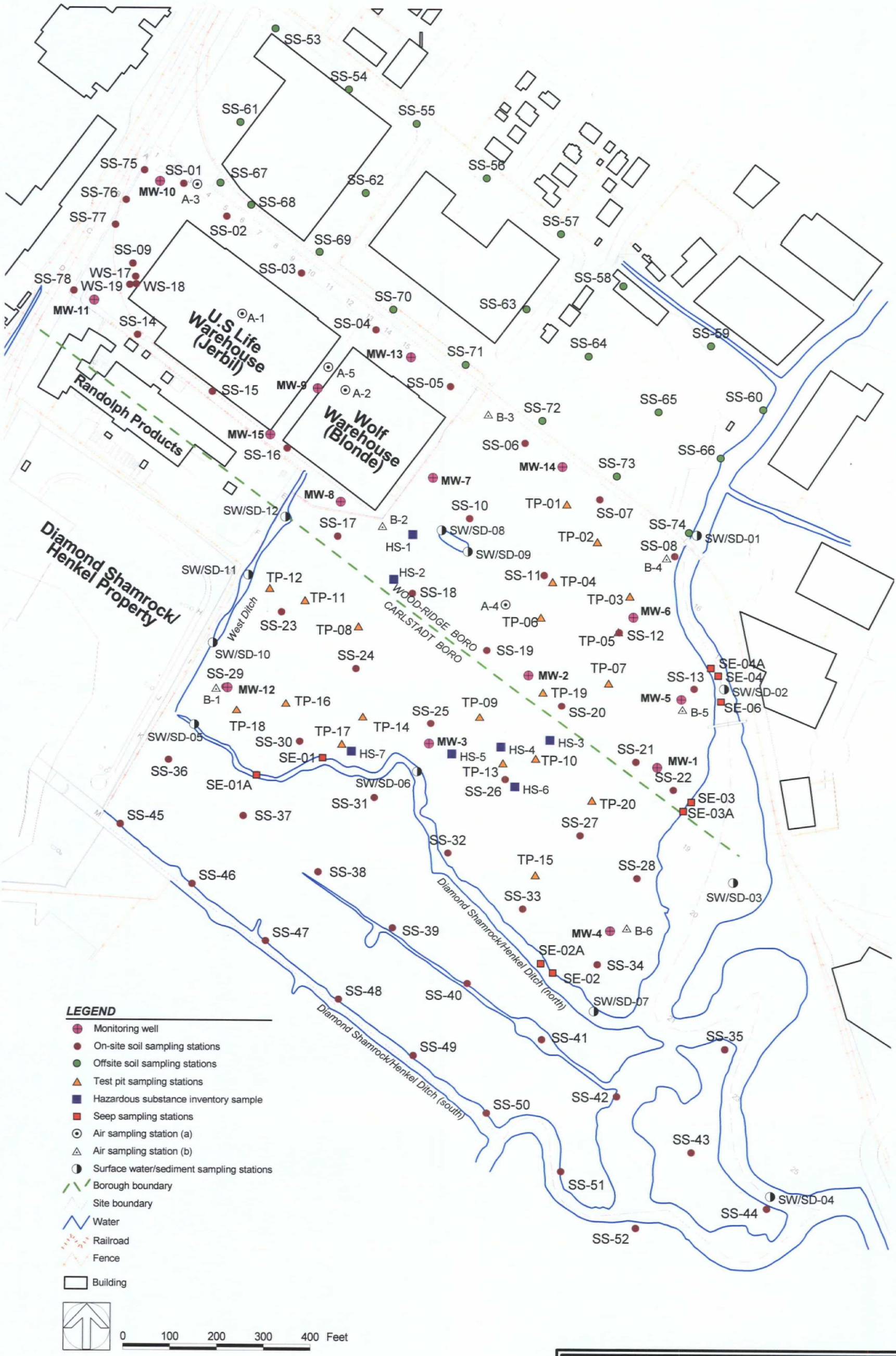
Site boundary shown as white line

OU1 Operable Unit 1

OU2 Operable Unit 2

0 200 feet
approximate scale

Figure 1-2. Site layout map.



NOTE: The warehouse evaluation samples and interior soil samples appear on Figure 2-2 in the RI.

Source map survey by: James Stewart, Inc.

Figure 3-1. Remedial investigation sample locations.

Tables

Table 3-1. Contaminants of potential concern in various media at OU1 of the Ventron/Velsicol site

Analyte	Developed Area Soils (current scenario) (0–12 in.)	Developed Area Soils (future scenario) (0–12 in.)	Undeveloped Area Sediments (0–12 in.)	Undeveloped Area Soils and Wastes (0–12 in.)	Developed Area Subsurface Soils	Undeveloped Area Subsurface Soils	Surface Water	Ground-water	Outdoor Air	Indoor Air from Developed Area Subsurface Soils	Indoor Air from Undeveloped Area Subsurface Soils	Indoor Air from Developed Area Groundwater	Indoor Air from Undeveloped Area Groundwater
INORGANIC ANALYTES													
Aluminum	X	X	X	X		X							
Antimony				X		X							
Arsenic	X	X	X	X	X	X		X					
Barium				X	X	X		X					
Cadmium			X	X		X		X					
Chromium	X	X	X	X	X	X							
Copper	X	X		X	X	X		X					
Iron	X	X	X	X	X	X	X	X					
Lead				X		X							
Manganese	X	X		X	X	X	X	X					
Mercury (total)	X	X	X	X	X	X	X	X					
Methylmercury[a]			X	X		X	X	X					
Mercury vapor									X				
Nickel				X		X		X					
Selenium						X							
Silver				X		X							
Thallium		X	X	X	X	X		X					
Vanadium	X	X	X	X		X		X					
Zinc			X	X		X							
ORGANIC ANALYTES													
Semivolatile Organic Analytes													
4-Methylphenol								X					
bis[2-Ethylhexyl]phthalate				X									
Carbazole						X					X		
Volatile Organic Analytes													
1,4-Dichlorobenzene								X				X	X
1,2-Dichloroethene, isomers								X				X	X
4-Methyl-2-pentanone								X				X	X
Acetone								X				X	X
Benzene		X			X			X		X		X	X
Chlorobenzene								X				X	X
Chloroethane								X				X	X
Toluene						X		X			X	X	X
Xylenes						X		X			X	X	X
Polycyclic Aromatic Hydrocarbons													
2-Methylnaphthalene				X	X	X		X		X	X	X	X
Benz[a]anthracene		X	X	X		X					X		
Benzo[a]pyrene	X	X	X	X		X					X		
Benzo[b]fluoranthene	X	X	X	X		X					X		
Benzo[ghi]perylene						X					X		
Benzo[k]fluoranthene						X					X		
Dibenz[a,h]anthracene	X	X	X	X		X					X		
Indeno[1,2,3-cd]pyrene			X	X		X					X		
Naphthalene				X		X		X			X	X	X
Polychlorinated Biphenyls													
Aroclor® 1242						X							
Aroclor® 1248			X	X		X							
Aroclor® 1254						X							
Aroclor® 1260			X		X								

Note: OU - operable unit

[a] Methylmercury has been retained as a CoPC where present based on past historical use at this site.

Table 4-1. Exposure point concentrations for total mercury with and without Samples SS-04 and HS-5

	No. of Results	Frequency of Detection	Minimum	Maximum	95 percent UCL	EPC
Developed Area						
With SS-04	15	100%	9.3	13,800	15,541	13,800
Without SS-04	14	100%	9.3	2,250	5,884	2,250
Undeveloped Area						
With HS-5	41	100%	0.33	295,000	7,332	7,332
Without HS-5	40	100%	0.33	588	507	507

Note: EPC - exposure point concentration
UCL - upper confidence limit

Table 6-1. Summary of total excess lifetime cancer risks for reasonable maximum exposure scenarios

Receptor/Exposure Pathway	Cancer Risk	Percent Contribution by Pathway	Cancer Risk	Percent Contribution by Pathway	Chemicals with Primary Contribution to Risk for each Pathway
Developed Area		**Adult**		**Child**	
Long-term Worker - Current					
Outdoor Air	0E+0				No carcinogens detected
Total - Outdoor Air:	0E+0	0%			
Surface Soil - unpaved					
Ingestion of Surface Soil	4E-6	17%	NA	--	Arsenic, PAHs
Dermal Contact with Surface Soil	2E-6	11%	NA	--	Arsenic, PAHs
Inhalation of vapors in indoor air (soil)	1E-5	71%	NA	--	Benzene
Inhalation of vapors in indoor air (groundwater)	2E-7	1%	NA	--	Benzene
Total for Commercial Worker:	**2E-5**	100%			
Long-term Worker - Future					
Outdoor Air	0E+0				No carcinogens detected
Total - Outdoor Air:	0E+0	0%			
Surface Soil - paved and unpaved					
Ingestion of Surface Soil	4E-6	6%	NA	--	Arsenic, PAHs
Dermal Contact with Surface Soil	3E-6	5.1%	NA	--	PAHs, arsenic
Inhalation of vapors in indoor air (soil)	1E-5	22.3%	NA	--	Benzene
Inhalation of vapors in indoor air (groundwater)	2E-7	0.2%	NA	--	Benzene
Total - Surface Soil:	2E-5				
Exposure to Groundwater as Workplace Drinking Water					
Ingestion of Groundwater	4E-5	66%	NA	--	Arsenic, benzene
Dermal Contact with Groundwater	3E-9	0.01%	NA	--	Benzene, arsenic, 1,4-dichlorobenzene
Total - Groundwater:	4E-5				
Total for Commercial Worker:	**7E-5**	100%			
Construction Worker - Current/Future					
Exposure to Subsurface Soil					
Ingestion of Subsurface Soil	5E-8	69%	NA	--	Arsenic
Dermal Contact with Subsurface Soil	2E-8	31%	NA	--	Arsenic, PCBs
Total for Construction Worker:	**8E-8**	100%			
Undeveloped Area					
Long-term Worker - Future					
Surface Soil					
Ingestion of Surface Soil	1E-5	15%	NA	--	PAHs, arsenic, PCBs
Dermal Contact with Surface Soil	1E-5	20%	NA	--	PAHs, PCBs, arsenic
Inhalation of vapors in indoor air (soil)	5E-7	1%	NA	--	Benzo[a]pyrene
Inhalation of vapors in indoor air (groundwater)	2E-7	0.2%	NA	--	Benzene
Total - Surface Soil, Indoor Air:	2E-5				
Exposure to Groundwater as Workplace Drinking Water					
Ingestion of Groundwater	4E-5	64%	NA	--	Arsenic, benzene
Dermal Contact with Groundwater	3E-9	0.005%	NA	--	Benzene, arsenic, 1,4-dichlorobenzene
Total - Groundwater:	4E-5				
Total for Commercial Worker:	**7E-5**	100%			
Construction Worker - Current/Future					
Exposure to Subsurface Soil					
Ingestion of Subsurface Soil	2E-7	49%	NA	--	Arsenic, PAHs, PCBs
Dermal Contact with Subsurface Soil	2E-7	51%	NA	--	PAHs, PCBs, arsenic
Total for Construction Worker:	**4E-7**	100%			
Trespassers - Current/Future					
Exposure to Surface Soil					
Ingestion of Surface Soil	1E-5	70%	5E-6	54%	PAHs, arsenic, PCBs
Dermal Contact with Surface Soil	5E-6	30%	5E-6	46%	PAHs, PCBs, arsenic
Total for Trespassers - Surface Soil:	2E-5	100%	1E-5	100%	
Contact with Surface Water and Sediments in OU1					
Ingestion of Sediments	7E-6	74%	3E-6	58%	PAHs, arsenic
Dermal Contact with Sediments	3E-6	26%	2E-6	42%	PAHs, arsenic
Ingestion of Surface Water	0E+0	0%	0E+0	0%	No carcinogens detected
Dermal Contact with Surface Water	0E+0	0%	0E+0	0%	No carcinogens detected
Total for Trespassers - Sediments/ Surface Water:	1E-5	100%	5E-6	100%	
Hypothetical Future Residential Use of Groundwater					
Ingestion of Groundwater	1E-4	70%	1E-4	73%	Arsenic, benzene
Dermal Contact with Groundwater	8E-7	0%	5E-7	0%	Arsenic, benzene, 1,4-dichlorobenzene
Inhalation from showering or bathing	6E-5	30%	4E-5	27%	Benzene, 1,4-dichlorobenzene, BEHP
Total - Hypothetical Residential Use of Groundwater:	2E-4	100%	1E-4	100%	

Note: PAH - polycyclic aromatic hydrocarbons
PCB - polychlorinated biphenyls

Table 6-2. Summary of total excess lifetime cancer risks for central tendency exposure scenarios

Receptor/Exposure Pathway	Cancer Risk	Percent Contribution by Pathway	Cancer Risk	Percent Contribution by Pathway	Chemicals with Primary Contribution to Risk for each Pathway
	Adult		Child		
Developed Area					
Long-term Worker - Current					
Outdoor Air	0E+0				No carcinogens detected
Total - Outdoor Air:	0E+0				
Surface Soil - unpaved					
Ingestion of Surface Soil	9E-7	24%	NA	--	Arsenic, PAHs
Dermal Contact with Surface Soil	6E-8	2%	NA	--	Arsenic, PAHs
Inhalation of vapors in indoor air (soil)	3E-6	74%	NA	--	Benzene
Inhalation of vapors in indoor air (groundwater)	3E-8	0.8%	NA	--	Benzene
Total for Commercial Worker:	**4E-6**	100%			
Long-term Worker - Future					
Outdoor Air	0E+0				No carcinogens detected
Total - Outdoor Air:	0E+0				
Surface Soil - paved and unpaved					
Ingestion of Surface Soil	1E-6	14%	NA	--	Arsenic, PAHs
Dermal Contact with Surface Soil	9E-8	1.1%	NA	--	PAHs, arsenic
Inhalation of vapors in indoor air (soil)	3E-6	35.6%	NA	--	Benzene
Inhalation of vapors in indoor air (groundwater)	3E-8	0.4%	NA	--	Benzene
Total - Surface Soil, Indoor Air:	**4E-6**				
Exposure to Groundwater as Workplace Drinking Water					
Ingestion of Groundwater	4E-6	49%	NA	--	Arsenic, benzene
Dermal Contact with Groundwater	7E-10	0.01%	NA	--	Benzene, arsenic, 1,4-dichlorobenzene
Total - Groundwater:	4E-6				
Total for Commercial Worker:	**8E-6**	100%			
Construction Worker - Current/Future					
Exposure to Subsurface Soil					
Ingestion of Subsurface Soil	1E-7	97%	NA	--	Arsenic
Dermal Contact with Subsurface Soil	5E-9	3%	NA	--	Arsenic, PCBs
Total for Construction Worker:	**2E-7**	100%			
Undeveloped Area					
Long-term Worker - Future					
Surface Soil					
Ingestion of Surface Soil	3E-6	37%	NA	--	PAHs, arsenic, PCBs
Dermal Contact with Surface Soil	4E-7	5%	NA	--	PAHs, PCBs, arsenic
Inhalation of vapors in indoor air (soil)	1E-7	1%	NA	--	Benzo[a]pyrene
Inhalation of vapors in indoor air (groundwater)	3E-8	0.4%	NA	--	Benzene
Total - Surface Soil, Indoor Air:	3E-6				
Exposure to Groundwater as Workplace Drinking Water					
Ingestion of Groundwater	4E-6	56%	NA	--	Arsenic, benzene
Dermal Contact with Groundwater	7E-10	0.010%	NA	--	Benzene, arsenic, 1,4-dichlorobenzene
Total - Groundwater:	4E-6				
Total for Commercial Worker:	**7E-6**	100%			
Construction Worker - Current/Future					
Exposure to Subsurface Soil					
Ingestion of Subsurface Soil	6E-7	93%	NA	--	Arsenic, PAHs, PCBs
Dermal Contact with Subsurface Soil	4E-8	7%	NA	--	PAHs, PCBs, arsenic
Total for Construction Worker:	**6E-7**	100%			
Trespassers - Current/Future					
Exposure to Surface Soil					
Ingestion of Surface Soil	9E-7	89%	1E-6	75%	PAHs, arsenic, PCBs
Dermal Contact with Surface Soil	1E-7	11%	4E-7	25%	PAHs, PCBs, arsenic
Total for Trespassers - Surface Soil:	1E-6	100%	2E-6	100%	
Contact with Surface Water and Sediments in OU1					
Ingestion of Sediments	5E-7	91%	8E-7	78%	PAHs, arsenic
Dermal Contact with Sediments	5E-8	9%	2E-7	22%	PAHs, arsenic
Ingestion of Surface Water	0E+0	0%	0E+0	0%	No carcinogens detected
Dermal Contact with Surface Water	0E+0	0%	0E+0	0%	No carcinogens detected
Total for Trespassers - Sediments/ Surface Water:	6E-7	100%	1E-6	100%	
Hypothetical Future Residential Use of Groundwater					
Ingestion of Groundwater	3E-5	79%	5E-5	80%	Arsenic, benzene
Dermal Contact with Groundwater	9E-8	0%	1E-7	0%	Arsenic, benzene, 1,4-dichlorobenzene
Inhalation from showering or bathing	8E-6	21%	1E-5	20%	Benzene, 1,4-dichlorobenzene, BEHP
Total - Hypothetical Residential Use of Groundwater:	4E-5	100%	6E-5	100%	

Note: PAH - polycyclic aromatic hydrocarbons
PCB - polychlorinated biphenyls

Table 6-3. Summary of total hazard indices for reasonable maximum exposure scenarios

Receptor/Exposure Pathway	Hazard Index	Percent Contribution by Pathway	Hazard Index	Percent Contribution by Pathway	Chemicals with Primary Contribution to Risk for each Pathway
Developed Area		**Adult**		**Child**	
Long-term Worker - Current					
Outdoor Air	0.025				Mercury vapor
Total - Outdoor Air:	0.025	3%			
Surface Soil - unpaved					
Ingestion of Surface Soil	0.60	62%	NA	--	Mercury
Dermal Contact with Surface Soil	0.0071	0.7%	NA	--	Arsenic
Inhalation of vapors in indoor air (soil)	0.33	34%	NA	--	Benzene, 2-methylnaphthalene
Inhalation of vapors in indoor air (groundwater)	0.0088	0.9%	NA	--	Toluene, naphthalene, benzene, xylenes
Total - Surface Soil, Indoor Air:	0.95				
Total for Commercial Worker:	**0.97**	100%			
Long-term Worker - Future					
Outdoor Air	0.025				Mercury vapor
Total - Outdoor Air:	0.025	0.4%			
Surface Soil - paved and unpaved					
Ingestion of Surface Soil	3.8	62%	NA	--	Mercury
Dermal Contact with Surface Soil	0.0071	0.12%	NA	--	Arsenic
Inhalation of vapors in indoor air (soil)	0.33	5%	NA	--	Benzene, 2-methylnaphthalene
Inhalation of vapors in indoor air (groundwater)	0.0088	0.14%	NA	--	Toluene, naphthalene, benzene, xylenes
Total - Surface Soil:	4.1				
Exposure to Groundwater as Workplace Drinking Water					
Ingestion of Groundwater	2.0	32%	NA	--	Iron, manganese, thallium, mercury, arsenic
Dermal Contact with Groundwater	0.00091	0.01%	NA	--	Manganese, mercury
Total - Groundwater:	2.0				
Total for Commercial Worker:	**6.1**	100%			
Construction Worker - Current/Future					
Exposure to Subsurface Soil					
Ingestion of Subsurface Soil	0.55	99%	NA	--	Mercury
Dermal Contact with Subsurface Soil	0.0054	1%	NA	--	PCBs, arsenic
Total for Construction Worker:	**0.56**	100%			
Undeveloped Area					
Long-term Worker - Future					
Surface Soil					
Ingestion of Surface Soil	1.2	29%	NA	--	Mercury, PCBs
Dermal Contact with Surface Soil	0.21	5%	NA	--	PCBs
Inhalation of vapors in indoor air (soil)	0.76	19%	NA	--	PAHs, xylenes
Inhalation of vapors in indoor air (groundwater)	0.0088	0%	NA	--	Toluene, naphthalene, benzene, xylenes
Total - Surface Soil, Indoor Air:	2.2				
Exposure to Groundwater as Workplace Drinking Water					
Ingestion of Groundwater	2.0	47%	NA	--	Iron, manganese, thallium, mercury, arsenic
Dermal Contact with Groundwater	0.00091	0%	NA	--	Manganese, mercury
Total - Groundwater:	2.0				
Total for Commercial Worker:	**4.1**	100%			
Construction Worker - Current/Future					
Exposure to Subsurface Soil					
Ingestion of Subsurface Soil	0.39	88%	NA	--	Mercury
Dermal Contact with Subsurface Soil	0.051	12%	NA	--	PCBs
Total for Construction Worker:	**0.44**	100%			
Trespassers - Current/Future					
Exposure to Surface Soil					
Ingestion of Surface Soil	1.2	95%	1.8	90.4%	Mercury, PCBs
Dermal Contact with Surface Soil	0.066	5%	0.19	9.6%	PCBs
Total for Trespassers - Surface Soil:	1.3	100%	2.0	100%	
Contact with Surface Water and Sediments in OU1					
Ingestion of Sediments	2.4	98%	3.4	98%	Mercury
Dermal Contact with Sediments	0.012	1%	0.035	1%	PCBs
Ingestion of Surface Water	0.0047	0%	0.0068	0.2%	Mercury
Dermal Contact with Surface Water	0.031	1%	0.032	0.9%	Mercury, manganese
Total for Trespassers - Sediments/ Surface Water:	2.4	100%	3.5	100%	
Hypothetical Future Residential Use of Groundwater					
Ingestion of Groundwater	5.5	46%	19	49%	Iron, manganese, thallium, mercury, arsenic
Dermal Contact with Groundwater	0.12	1%	0.37	1.0%	Manganese, mercury
Inhalation from showering or bathing	6.3	53%	19	50%	Naphthalene, 4-methylphenol, benzene, xylenes
Total - Hypothetical Residential Use of Groundwater:	12	100%	39	100%	

Note: PAH - polycyclic aromatic hydrocarbons
PCB - polychlorinated biphenyls

Table 6-4. Summary of total hazard indices for central tendency exposure scenarios

Receptor/Exposure Pathway	Hazard Index	Percent Contribution by Pathway	Hazard Index	Percent Contribution by Pathway	Chemicals with Primary Contribution to Risk for each Pathway
Developed Area	**Adult**		**Child**		
Long-term Worker - Current					
Outdoor Air	0.010	1%			Mercury vapor
Total - Outdoor Air:	0.010				
Surface Soil - unpaved					
Ingestion of Surface Soil	0.60	69%	NA	--	Mercury
Dermal Contact with Surface Soil	0.00071	0%	NA	--	Arsenic
Inhalation of vapors in indoor air (soil)	0.25	29%	NA	--	Benzene, 2-methylnaphthalene
Inhalation of vapors in indoor air (groundwater)	0.0066	1%	NA	--	Toluene, naphthalene, benzene, xylenes
Total for Commercial Worker:	**0.87**	100%			
Long-term Worker - Future					
Outdoor Air	0.010				Mercury vapor
Total - Outdoor Air:	0.010	100%			
Surface Soil - paved and unpaved					
Ingestion of Surface Soil	3.8	93%	NA	--	Mercury
Dermal Contact with Surface Soil	0.00071	0%	NA	--	Arsenic
Inhalation of vapors in indoor air (soil)	0.25	6%	NA	--	Benzene, 2-methylnaphthalene
Inhalation of vapors in indoor air (groundwater)	0.0066	0%	NA	--	Toluene, naphthalene, benzene, xylenes
Total - Surface Soil, Indoor Air:	4.0	100%			
Exposure to Groundwater as Workplace Drinking Water					
Ingestion of Groundwater	0.50	100%	NA	--	Iron, manganese, thallium, mercury, arsenic
Dermal Contact with Groundwater	0.00074	0%	NA	--	Manganese, mercury
Total - Groundwater:	0.50				
Total for Commercial Worker:	**4.5**	100%			
Construction Worker - Current/Future					
Exposure to Subsurface Soil					
Ingestion of Subsurface Soil	0.0092	89%	NA	--	Mercury
Dermal Contact with Subsurface Soil	0.0011	11%	NA	--	PCBs, arsenic
Total for Construction Worker:	**0.010**	100%			
Undeveloped Area					
Long-term Worker - Future					
Surface Soil					
Ingestion of Surface Soil	1.2	52%	NA	--	Mercury, PCBs
Dermal Contact with Surface Soil	0.021	1%	NA	--	PCBs
Inhalation of vapors in indoor air (soil)	0.57	25%	NA	--	PAHs, xylenes
Inhalation of vapors in indoor air (groundwater)	0.0066	0%	NA	--	Toluene, naphthalene, benzene, xylenes
Total - Surface Soil, Indoor Air:	1.8				
Exposure to Groundwater as Workplace Drinking Water					
Ingestion of Groundwater	0.50	22%	NA	--	Iron, manganese, thallium, mercury, arsenic
Dermal Contact with Groundwater	0.00074	0.0%	NA	--	Manganese, mercury
Total - Groundwater:	0.50				
Total for Commercial Worker:	2.3	100%			
Construction Worker - Current/Future					
Exposure to Subsurface Soil					
Ingestion of Subsurface Soil	0.0064	38%	NA	--	Mercury
Dermal Contact with Subsurface Soil	0.011	62%	NA	--	PCBs
Total for Construction Worker:	**0.017**	100%			
Trespassers - Current/Future					
Exposure to Surface Soil					
Ingestion of Surface Soil	0.31	99%	0.44	96%	Mercury, PCBs
Dermal Contact with Surface Soil	0.0047	1%	0.019	4%	PCBs
Total for Trespassers - Surface Soil:	0.31	100%	0.46	100%	
Contact with Surface Water and Sediments in OU1					
Ingestion of Sediments	0.58	98%	0.83	98%	Mercury
Dermal Contact with Sediments	0.00087	0%	0.0035	0%	PCBs
Ingestion of Surface Water	0.0012	0%	0.0017	0%	Mercury
Dermal Contact with Surface Water	0.0077	1%	0.0078	1%	Mercury, manganese
Total for Trespassers - Sediments/ Surface Water:	0.59	100%	0.85	100%	
Hypothetical Future Residential Use of Groundwater					
Ingestion of Groundwater	3.8	58%	0.81	11%	Iron, manganese, thallium, mercury, arsenic
Dermal Contact with Groundwater	0.048	1%	0.12	2%	Manganese, mercury
Inhalation from showering or bathing	2.7	41%	6.3	87%	Naphthalene, 4-methylphenol, benzene, xylenes
Total - Hypothetical Residential Use of Groundwater:	6.6	100%	7.3	100%	

Note: PAH - polycyclic aromatic hydrocarbons
PCB - polychlorinated biphenyls

Table 6-5. Comparison of OU1 soil arsenic concentrations with New Jersey suburban background

Area	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	90th percentile Concentration (mg/kg)
Developed area (paved and unpaved)	0.85 ND	11	8.4
Developed area (unpaved only)	0.85 ND	11	9.4
Undeveloped area	1.4 ND	26	12
New Jersey suburban background	0.02	22.7	10.7

Source: NJDEP (1993).

Note: ND - not detected

Appendix A

RAGS D Tables

Table 1.
Selection of exposure pathways
Ventron/Velsicol Site OU1

Scenario Timeframe	Onsite Medium (Except as indicated)	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Onsite/ Offsite	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Soil	Surface soil	Developed area surface soil (unpaved soil only)	Long-term worker	Adult	Combined (ingestion and dermal absorption)	Onsite	Quantitative	Contact with CoPCs in surface soil by workers identified as a potential pathway and evaluated in risk assessment
Current/Future	Soil, sediment, surface water	Soil, sediment, surface water	Soil, sediment, surface water	Resident	Child/Adult	Combined (ingestion, dermal absorption)	Onsite	Qualitative	Residential use evaluated for hypothetical drinking water pathway only due to current and likely future commercial use.
	Offsite soil, water and biota	Offsite soil, groundwater, surface water, sediment and biota	Offsite soil, groundwater, surface water, sediment and biota	Recreational users	Child/adult	Combined (ingestion, dermal absorption and inhalation)	Offsite	Qualitative	Potential for migration of CoPCs to offsite media and evaluation of exposure to CoPCs, if any, in offsite media will be evaluated as part of the OU2 investigation.
	Combined (soil and groundwater)	Air	Indoor air (developed and undeveloped areas)	Long-term worker	Adult	Inhalation	Onsite	Quantitative	Inhalation of contaminants inside of buildings that have migrated from soil and groundwater
	Soil	Air	Outdoor air (developed and undeveloped areas); indoor air (developed area)	Long-term worker	Adult	Inhalation	Onsite	Quantitative	Contact with CoPCs in air by workers identified as a potential pathway and evaluated in risk assessment. Quantified based on mercury data and qualitatively evaluated for remaining CoPCs.
		Surface soil	Undeveloped area surface soil	Trespasser/ Visitor	Adult/ Adolescents/ Pre-Adolescents	Combined (ingestion and dermal absorption)	Onsite	Quantitative	Contact with CoPCs in surface soil by trespassers identified as a potential pathway and evaluated in risk assessment
		Subsurface soil	Developed and undeveloped areas subsurface soil (1-20 ft depths)	Construction worker	Adult	Combined (ingestion and dermal absorption)	Onsite	Quantitative	Contact with CoPCs in subsurface soil by construction workers identified as a potential pathway and evaluated in risk assessment
	Sediment	Sediment	Undeveloped area surface sediment[a]	Trespasser/ Visitor	Adult/ Adolescents/ Pre-Adolescents	Combined (ingestion and dermal absorption)	Onsite	Quantitative	Contact with CoPCs in sediments by trespassers identified as a potential pathway and evaluated in risk assessment
	Surface Water	Surface Water	Undeveloped area surface water[a]	Trespasser/ Visitor	Adult/ Adolescents/ Pre-Adolescents	Combined (ingestion and dermal absorption)	Onsite	Quantitative	Contact with CoPCs in OU1 surface water by trespassers identified as a potential pathway and evaluated in risk assessment
Future	Soil	Surface soil	Developed area surface soil (all)	Long-term worker	Adult	Combined (ingestion and dermal absorption)	Onsite	Quantitative	Contact with CoPCs in surface soil by workers identified as a potential pathway and evaluated in risk assessment
		Surface soil	Undeveloped area surface soil	Long-term worker	Adult	Combined (ingestion and dermal absorption)	Onsite	Quantitative	Contact with CoPCs in surface soil by workers identified as a potential pathway and evaluated in risk assessment
	Groundwater	Groundwater	Groundwater sitewide	Long-term worker	Adult	Combined (ingestion and dermal absorption)	Onsite	Quantitative	Use of groundwater as workplace drinking water identified as a potential pathway and evaluated in risk assessment
		Groundwater	Groundwater sitewide, indoor air (bathroom)	Future hypothetical resident	Child/Adult	Combined (ingestion, dermal absorption and inhalation)	Onsite	Quantitative	Residential use of groundwater as drinking water evaluated in hypothetical scenario because site groundwater is designated as a potable aquifer.

Note: OU1 - Operable Unit 1 CoPC - contaminants of potential concern

[a] Surface water and sediments addressed are from West Ditch and the onsite basin.

Table 2.1
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

Scenario Timeframe:	Current
Medium:	Soil
Exposure Medium:	Surface soil
Exposure Point:	Developed Area surface soil

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
	INORGANIC ANALYTES																
7429-90-5	Aluminum	3370		12000		mg/kg	SS-16	3/3	–	12000	N/A	7600	N			Yes	ASL
7440-36-0	Antimony	–		–		mg/kg		0/3	0.76–0.97	ND	0.05	3.1	N			No	IFD
7440-38-2	Arsenic	5.8		11		mg/kg	SS-14	2/3	0.85–0.85	11	10.7	0.39	C			Yes	ASL
7440-39-3	Barium	26.9	J	190		mg/kg	SS-14	3/3	–	190	N/A	540	N			No	BSL
7440-41-7	Beryllium	0.68		0.68		mg/kg	SS-14	1/3	0.26–0.52	0.68	1.16	15	N			No	BSL
7440-43-9	Cadmium	0.97	J	3.1	J	mg/kg	SS-16	2/3	0.047–0.047	3.1	0.32	3.7	N			No	BSL
7440-70-2	Calcium	900	J	31000		mg/kg	SS-14	3/3	–	31000	N/A	N/A				No	NTX
7440-47-3	Chromium	6.7	J	96.9	J	mg/kg	SS-16	3/3	–	96.9	18.7	22	N[b]			Yes	ASL
7440-48-4	Cobalt	2.6		12.6		mg/kg	SS-16	3/3	–	12.6	N/A	140	N			No	BSL
7440-50-8	Copper	18.5	J	470	J	mg/kg	SS-14	3/3	–	470	28.4	290	N			Yes	ASL
7439-89-6	Iron	3900	J	23000		mg/kg	SS-16	3/3	–	23000	N/A	2300	N			Yes	ASL
7439-92-1	Lead	17.8	J	390		mg/kg	SS-14	3/3	–	390	100	400	N			No	BSL
7439-95-4	Magnesium	771	J	11000		mg/kg	SS-16	3/3	–	11000	N/A	N/A				No	NTX
7439-96-5	Manganese	126	J	540	J	mg/kg	SS-14	3/3	–	540	846	180	N			Yes	ASL
7439-97-6	Mercury	9.3		310		mg/kg	SS-14	3/3	–	310	0.14	2.3	N			Yes	ASL
7440-02-0	Nickel	4.7	J	72.2	J	mg/kg	SS-14	3/3	–	72.2	14.9	160	N			No	BSL
7440-09-7	Potassium	238		1500		mg/kg	SS-14	3/3	–	1500	N/A	N/A				No	NTX
7782-49-2	Selenium	0.69		0.69		mg/kg	SS-16	1/3	0.54–1.6	0.69	0.17	39	N			No	BSL
7440-22-4	Silver	–		–		mg/kg		0/3	0.41–1.9	ND	0.26	39	N			No	IFD
7440-23-5	Sodium	630		630		mg/kg	SS-16	1/3	270–290	630	N/A	N/A				No	NTX
7440-28-0	Thallium	–		–		mg/kg		0/3	0.86–3.9	ND	0.19	0.52	N			No	IFD
7440-62-2	Vanadium	6		140		mg/kg	SS-14	3/3	–	140	34.4	55	N			Yes	ASL
7440-66-6	Zinc	89	J	1100		mg/kg	SS-14	3/3	–	1100	82.6	2300	N			No	BSL
	ORGANIC ANALYTES																
120-82-1	1,2,4-Trichlorobenzene	–		–		µg/kg		0/3	370–480	ND		65000	N			No	IFD
95-50-1	1,2-Dichlorobenzene	–		–		µg/kg		0/3	370–480	ND		110000	N			No	IFD
541-73-1	1,3-Dichlorobenzene	–		–		µg/kg		0/3	370–480	ND		1600	N			No	IFD
106-46-7	1,4-Dichlorobenzene	–		–		µg/kg		0/3	370–480	ND		3400	C			No	IFD
108-60-1	2,2'-Oxybis[1-chloropropane]	–		–		µg/kg		0/3	370–480	ND		2900	C			No	IFD
95-95-4	2,4,5-Trichlorophenol	–		–		µg/kg		0/3	930–1200	ND		610000	N			No	IFD
88-06-2	2,4,6-Trichlorophenol	–		–		µg/kg		0/3	370–480	ND		610	N			No	IFD
120-83-2	2,4-Dichlorophenol	–		–		µg/kg		0/3	370–480	ND		18000	N			No	IFD
105-67-9	2,4-Dimethylphenol	–		–		µg/kg		0/3	370–480	ND		120000	N			No	IFD
51-28-5	2,4-Dinitrophenol	–		–		µg/kg		0/3	930–1200	ND		12000	N			No	IFD
121-14-2	2,4-Dinitrotoluene	–		–		µg/kg		0/3	370–480	ND		12000	N			No	IFD
606-20-2	2,6-Dinitrotoluene	–		–		µg/kg		0/3	370–480	ND		6100	N			No	IFD
91-58-7	2-Chloronaphthalene	–		–		µg/kg		0/3	370–480	ND		490000	N			No	IFD
95-57-8	2-Chlorophenol	–		–		µg/kg		0/3	370–480	ND		6300	N			No	IFD
534-52-1	2-Methyl-4,6-dinitrophenol	–		–		µg/kg		0/3	930–1200	ND		N/A				No	IFD
95-48-7	2-Methylphenol	–		–		µg/kg		0/3	370–480	ND		310000	N			No	IFD
88-74-4	2-Nitroaniline	–		–		µg/kg		0/3	930–1200	ND		170	N			No	IFD
88-75-5	2-Nitrophenol	–		–		µg/kg		0/3	370–480	ND		N/A	N			No	IFD
91-94-1	3,3'-Dichlorobenzidine	–		–		µg/kg		0/3	370–480	ND		1100	C			No	IFD
99-09-2	3-Nitroaniline	–		–		µg/kg		0/3	930–1200	ND		N/A				No	IFD
101-55-3	4-Bromophenyl-phenyl ether	–		–		µg/kg		0/3	370–480	ND		N/A				No	IFD

Table 2.1
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]	Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
59-50-7	4-Chloro-3-methylphenol	–		–		µg/kg		0/3	370–480	ND		N/A			No	IFD
106-47-8	4-Chloroaniline	–		–		µg/kg		0/3	370–480	ND		24000 N			No	IFD
7005-72-3	4-Chlorophenyl-phenyl ether	–		–		µg/kg		0/3	370–480	ND		N/A			No	IFD
106-44-5	4-Methylphenol	–		–		µg/kg		0/3	370–480	ND		31000 N			No	IFD
100-01-6	4-Nitroaniline	–		–		µg/kg		0/3	930–1200	ND		N/A			No	IFD
100-02-7	4-Nitrophenol	–		–		µg/kg		0/3	930–1200	ND		N/A			No	IFD
111-91-1	bis[2-chloroethoxy]methane	–		–		µg/kg		0/3	370–480	ND		N/A			No	IFD
111-44-4	bis[2-chloroethyl]ether	–		–		µg/kg		0/3	370–480	ND		210 C			No	IFD
117-81-7	bis[2-Ethylhexyl]phthalate	1600		8600		µg/kg	SS-16	2/3	400–400	8600		35000 C			No	BSL
85-68-7	Butylbenzyl phthalate	150		150		µg/kg	SS-16	1/3	370–400	150		1200000 N			No	BSL
86-74-8	Carbazole	–		–		µg/kg		0/3	370–480	ND		24000 C			No	IFD
132-64-9	Dibenzofuran	–		–		µg/kg		0/3	370–480	ND		29000 N			No	IFD
84-66-2	Diethyl phthalate	–		–		µg/kg		0/3	370–480	ND		4900000 N			No	IFD
131-11-3	Dimethyl phthalate	–		–		µg/kg		0/3	370–480	ND		61000000 N			No	IFD
84-74-2	Di-n-butyl phthalate	1000		1000		µg/kg	SS-16	1/3	370–400	1000		610000 N			No	BSL
117-84-0	Di-n-octyl phthalate	–		–		µg/kg		0/3	370–480	ND		240000 N			No	IFD
118-74-1	Hexachlorobenzene	–		–		µg/kg		0/3	370–480	ND		300 C			No	IFD
87-68-3	Hexachlorobutadiene	–		–		µg/kg		0/3	370–480	ND		1800 N			No	IFD
77-47-4	Hexachlorocyclopentadiene	–		–		µg/kg		0/3	370–480	ND		37000 N			No	IFD
67-72-1	Hexachloroethane	–		–		µg/kg		0/3	370–480	ND		6100 N			No	IFD
78-59-1	Isophorone	–		–		µg/kg		0/3	370–480	ND		510000 C			No	IFD
98-95-3	Nitrobenzene	–		–		µg/kg		0/3	370–480	ND		2000 N			No	IFD
621-64-7	N-nitroso-di-n-propylamine	–		–		µg/kg		0/3	370–480	ND		69 C			No	IFD
86-30-6	N-nitrosodiphenylamine	–		–		µg/kg		0/3	370–480	ND		99000 C			No	IFD
87-86-5	Pentachlorophenol	–		–		µg/kg		0/3	930–1200	ND		3000 C			No	IFD
108-95-2	Phenol	–		–		µg/kg		0/3	370–480	ND		3700000 N			No	IFD
71-55-6	1,1,1-Trichloroethane	–		–		µg/kg		0/3	11–14	ND		200000 N			No	IFD
79-34-5	1,1,2,2-Tetrachloroethane	–		–		µg/kg		0/3	11–14	ND		410 C			No	IFD
79-00-5	1,1,2-Trichloroethane	–		–		µg/kg		0/3	11–14	ND		730 C			No	IFD
75-34-3	1,1-Dichloroethane	–		–		µg/kg		0/3	11–14	ND		51000 N			No	IFD
75-35-4	1,1-Dichloroethene	–		–		µg/kg		0/3	11–14	ND		12400 N			No	IFD
107-06-2	1,2-Dichloroethane	–		–		µg/kg		0/3	11–14	ND		280 C			No	IFD
540-59-0	1,2-Dichloroethene isomers (total	–		–		µg/kg		0/3	11–14	ND		4300 N[c]			No	IFD
78-87-5	1,2-Dichloropropane	–		–		µg/kg		0/3	11–14	ND		340 C			No	IFD
78-93-3	2-Butanone	–		–		µg/kg		0/3	11–14	ND		730000 N			No	IFD
591-78-6	2-Hexanone	–		–		µg/kg		0/3	11–14	ND		N/A			No	IFD
108-10-1	4-Methyl-2-pentanone	–		–		µg/kg		0/3	11–14	ND		79000 N			No	IFD
67-64-1	Acetone	8	J	8	J	µg/kg	SS-15	1/3	12–14	8		160000 N			No	BSL
71-43-2	Benzene	–		–		µg/kg		0/3	11–14	ND		650 C			No	IFD
75-27-4	Bromodichloromethane	–		–		µg/kg		0/3	11–14	ND		820 C			No	IFD
75-25-2	Bromoform	–		–		µg/kg		0/3	11–14	ND		62000 C			No	IFD
74-83-9	Bromomethane	–		–		µg/kg		0/3	11–14	ND		390 N			No	IFD
75-15-0	Carbon disulfide	–		–		µg/kg		0/3	11–14	ND		36000 N			No	IFD
56-23-5	Carbon tetrachloride	–		–		µg/kg		0/3	11–14	ND		210 N			No	IFD
108-90-7	Chlorobenzene	–		–		µg/kg		0/3	11–14	ND		15000 N			No	IFD
75-00-3	Chloroethane	–		–		µg/kg		0/3	11–14	ND		3000 C			No	IFD
67-66-3	Chloroform	–		–		µg/kg		0/3	11–14	ND		360 N			No	IFD
74-87-3	Chloromethane	–		–		µg/kg		0/3	11–14	ND		1200 C			No	IFD
10061-01-5	cis-1,3-Dichloropropene	–		–		µg/kg		0/3	11–14	ND		780 C			No	IFD
124-48-1	Dibromochloromethane	–		–		µg/kg		0/3	11–14	ND		1100 C			No	IFD
100-41-4	Ethylbenzene	–		–		µg/kg		0/3	11–14	ND		8900 C			No	IFD
75-09-2	Methylene chloride	–		–		µg/kg		0/3	11–14	ND		9100 C			No	IFD

Table 2.1
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
100-42-5	Styrene	–		–		µg/kg		0/3	11–14	ND		440000	N			No	IFD
127-18-4	Tetrachloroethene	–		–		µg/kg		0/3	11–14	ND		1500	C			No	IFD
108-88-3	Toluene	–		–		µg/kg		0/3	11–14	ND		66000	N			No	IFD
10061-02-6	trans-1,3-Dichloropropene	–		–		µg/kg		0/3	11–14	ND		780	C			No	IFD
79-01-6	Trichloroethene	–		–		µg/kg		0/3	11–14	ND		53	C			No	IFD
75-01-4	Vinyl chloride	–		–		µg/kg		0/3	11–14	ND		79	C			No	IFD
1330-20-7	Xylene isomers (total)	–		–		µg/kg		0/3	11–14	ND		28000	N			No	IFD
	PAHs																
91-57-6	2-Methylnaphthalene	79		79		µg/kg	SS-16	1/3	370–400	79		5600	N[d]			No	BSL
83-32-9	Acenaphthene	230		230		µg/kg	SS-14	1/3	370–480	230		370000	N			No	BSL
208-96-8	Acenaphthylene	53		53		µg/kg	SS-16	1/3	370–400	53		5600	N[d]			No	BSL
120-12-7	Anthracene	85		85		µg/kg	SS-16	1/3	370–400	85		2200000	N			No	BSL
56-55-3	Benz[a]anthracene	310		310		µg/kg	SS-16	1/3	370–400	310		620	C			No	BSL
50-32-8	Benzo[a]pyrene	410		410		µg/kg	SS-16	1/3	370–400	410		62	C			Yes	ASL
205-99-2	Benzo[b]fluoranthene	73		750		µg/kg	SS-16	2/3	370–370	750		620	C			Yes	ASL
191-24-2	Benzo[ghi]perylene	300		300		µg/kg	SS-16	1/3	370–400	300		5600	N[d]			No	BSL
207-08-9	Benzo[k]fluoranthene	210		220		µg/kg	SS-16	2/3	400–400	220		6200	C			No	BSL
218-01-9	Chrysene	56		400		µg/kg	SS-16	2/3	370–370	400		62000	C			No	BSL
53-70-3	Dibenz[a,h]anthracene	71		71		µg/kg	SS-16	1/3	370–400	71		62	C			Yes	ASL
206-44-0	Fluoranthene	94		570		µg/kg	SS-16	3/3	–	570		230000	N			No	BSL
86-73-7	Fluorene	370		370		µg/kg	SS-14	1/3	370–480	370		270000	N			No	BSL
193-39-5	Indeno[1,2,3-cd]pyrene	270		270		µg/kg	SS-16	1/3	370–400	270		620	C			No	BSL
91-20-3	Naphthalene	92		92		µg/kg	SS-16	1/3	370–400	92		5600	N			No	BSL
85-01-8	Phenanthrene	270		270		µg/kg	SS-16	1/3	370–400	270		230000	N[e]			No	BSL
129-00-0	Pyrene	43		530		µg/kg	SS-16	3/3	–	530		230000	N			No	BSL

Note: All results reported as dry weight.
For the purposes of screening, field replicates have been averaged.
– - either no detected or undetected values
ARAR - applicable or relevant and appropriate requirement
C - carcinogenic based on a cancer risk of 1×10^{-6}
CoPC - chemical of potential concern
J - estimated value
N - noncarcinogenic based on hazard quotient of 0.1
N/A - not applicable
ND - not detected
PAH - polycyclic aromatic hydrocarbon
PRG - preliminary remediation goal
Q - qualifier
TBC - to be considered

Rationale Codes:
Selection Reason:
ASL - above screening levels
HIST - infrequent detection but associated historically
Deletion Reason:
BKG - below or consistent with background levels
BSL - below screening level
IFD - infrequent detection
NTX - no toxicity information
NUT - essential nutrient

[a] Screening toxicity values for soil are the PRGs taken from U.S. EPA Region IX (2003a). PRGs correspond to 1×10^{-6} or a hazard quotient of 0.1, whichever is lower.

[b] This default non-carcinogenic screening value for chromium is that for chromium(VI).

[c] This default non-carcinogenic screening value is that for *cis*-1,2-dichloroethene.

[d] This default screening value is that for naphthalene, the noncarcinogenic PAH with the most stringent risk-based concentration/PRG.

[e] Based on the risk-based concentration for pyrene. There is no EPA-derived toxicity value for phenanthrene. NJDEP and EPA indicated that the toxicity value for pyrene should be applied (NJDEP 2001).

Table 2.2

Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

Scenario Timeframe:	Future
Medium:	Soil
Exposure Medium:	Surface soil
Exposure Point:	Developed Area surface soil

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
	INORGANIC ANALYTES																
7429-90-5	Aluminum	3370		12000		mg/kg	SS-16	9/9	-	12000	N/A	7600	N			Yes	ASL
7440-36-0	Antimony	-		-		mg/kg		0/12	0.69-6.7	ND	0.05	3.1	N			No	IFD
7440-38-2	Arsenic	2.7	J	11		mg/kg	SS-14	7/10	0.85-3.4	11	10.7	0.39	C			Yes	ASL
7440-39-3	Barium	26.9	J	304		mg/kg	MW-15	10/10	-	304	N/A	540	N			No	BSL
7440-41-7	Beryllium	0.68		0.68		mg/kg	SS-14	1/9	0.26-0.52	0.68	1.16	15	N			No	BSL
7440-43-9	Cadmium	0.22	J	3.4		mg/kg	MW-15	7/13	0.047-0.54	3.4	0.32	3.7	N			No	BSL
7440-70-2	Calcium	900	J	31000		mg/kg	SS-14	9/9	-	31000	N/A	N/A				No	NTX
7440-47-3	Chromium	6.6	J	131		mg/kg	MW-15	10/10	-	131	18.7	22	N[b]			Yes	ASL
7440-48-4	Cobalt	2.6		12.6		mg/kg	SS-16	9/9	-	12.6	N/A	140	N			No	BSL
7440-50-8	Copper	12.4	J	7420		mg/kg	MW-15	13/13	-	7420	28.4	290	N			Yes	ASL
7439-89-6	Iron	3900	J	23900		mg/kg	MW-15	10/10	-	23900	N/A	2300	N			Yes	ASL
7439-92-1	Lead	17.8	J	390		mg/kg	SS-14	13/13	-	390	100	400	N			No	BSL
7439-95-4	Magnesium	771	J	11000		mg/kg	SS-16	9/9	-	11000	N/A	N/A				No	NTX
7439-96-5	Manganese	110	J	540	J	mg/kg	SS-14	10/10	-	540	846	180	N			Yes	ASL
7439-97-6	Mercury	9.3		13800		mg/kg	SS-04	15/15	-	13800	0.14	2.3	N			Yes	ASL
7440-02-0	Nickel	4.7	J	87.8		mg/kg	MW-15	8/10	7.5-11.6	87.8	14.9	160	N			No	BSL
7440-09-7	Potassium	238		1500		mg/kg	SS-14	9/9	-	1500	N/A	N/A				No	NTX
7782-49-2	Selenium	0.69		1.1		mg/kg	MW-15	2/10	0.49-1.6	1.1	0.17	39	N			No	BSL
7440-22-4	Silver	0.56	J	9.6		mg/kg	MW-15	6/10	0.4-1.9	9.6	0.26	39	N			No	BSL
7440-23-5	Sodium	630		630		mg/kg	SS-16	1/9	250-290	630	N/A	N/A				No	NTX
7440-28-0	Thallium	1.2		5.4		mg/kg	MW-15	2/13	0.83-3.9	5.4	0.19	0.52	N			Yes	ASL
7440-62-2	Vanadium	6		140		mg/kg	SS-14	9/9	-	140	34.4	55	N			Yes	ASL
7440-66-6	Zinc	89	J	2110		mg/kg	MW-15	13/13	-	2110	82.6	2300	N			No	BSL
	ORGANIC ANALYTES																
120-82-1	1,2,4-Trichlorobenzene	-		-		µg/kg		0/9	340-720	ND		65000	N			No	IFD
95-50-1	1,2-Dichlorobenzene	-		-		µg/kg		0/9	340-720	ND		110000	N			No	IFD
541-73-1	1,3-Dichlorobenzene	-		-		µg/kg		0/9	340-720	ND		1600	N			No	IFD
106-46-7	1,4-Dichlorobenzene	-		-		µg/kg		0/9	340-720	ND		3400	C			No	IFD
108-60-1	2,2'-Oxybis[1-chloropropane]	-		-		µg/kg		0/9	340-720	ND		2900	C			No	IFD
95-95-4	2,4,5-Trichlorophenol	-		-		µg/kg		0/9	860-1800	ND		610000	N			No	IFD
88-06-2	2,4,6-Trichlorophenol	-		-		µg/kg		0/9	340-720	ND		610	N			No	IFD
120-83-2	2,4-Dichlorophenol	-		-		µg/kg		0/9	340-720	ND		18000	N			No	IFD
105-67-9	2,4-Dimethylphenol	-		-		µg/kg		0/9	340-720	ND		120000	N			No	IFD
51-28-5	2,4-Dinitrophenol	-		-		µg/kg		0/9	860-1800	ND		12000	N			No	IFD
121-14-2	2,4-Dinitrotoluene	-		-		µg/kg		0/9	340-720	ND		12000	N			No	IFD
606-20-2	2,6-Dinitrotoluene	-		-		µg/kg		0/9	340-720	ND		6100	N			No	IFD
91-58-7	2-Chloronaphthalene	-		-		µg/kg		0/9	340-720	ND		490000	N			No	IFD
95-57-8	2-Chlorophenol	-		-		µg/kg		0/9	340-720	ND		6300	N			No	IFD
534-52-1	2-Methyl-4,6-dinitrophenol	-		-		µg/kg		0/9	860-1800	ND		N/A				No	IFD
95-48-7	2-Methylphenol	-		-		µg/kg		0/9	340-720	ND		310000	N			No	IFD
88-74-4	2-Nitroaniline	-		-		µg/kg		0/9	860-1800	ND		170	N			No	IFD
88-75-5	2-Nitrophenol	-		-		µg/kg		0/9	340-720	ND		N/A	N			No	IFD
91-94-1	3,3'-Dichlorobenzidine	-		-		µg/kg		0/9	340-720	ND		1100	C			No	IFD
99-09-2	3-Nitroaniline	-		-		µg/kg		0/9	860-1800	ND		N/A				No	IFD

Table 2.2
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
101-55-3	4-Bromophenyl-phenyl ether	–		–		µg/kg		0/9	340–720	ND		N/A				No	IFD
59-50-7	4-Chloro-3-methylphenol	–		–		µg/kg		0/9	340–720	ND		N/A				No	IFD
106-47-8	4-Chloroaniline	–		–		µg/kg		0/9	340–720	ND		24000	N			No	IFD
7005-72-3	4-Chlorophenyl-phenyl ether	–		–		µg/kg		0/9	340–720	ND		N/A				No	IFD
106-44-5	4-Methylphenol	–		–		µg/kg		0/9	340–720	ND		31000	N			No	IFD
100-01-6	4-Nitroaniline	–		–		µg/kg		0/9	860–1800	ND		N/A				No	IFD
100-02-7	4-Nitrophenol	–		–		µg/kg		0/9	860–1800	ND		N/A				No	IFD
111-91-1	bis[2-chloroethoxy]methane	–		–		µg/kg		0/9	340–720	ND		N/A				No	IFD
111-44-4	bis[2-chloroethyl]ether	–		–		µg/kg		0/9	340–720	ND		210	C			No	IFD
117-81-7	bis[2-Ethylhexyl]phthalate	310		10800		µg/kg	WS-19	11/12	400–400	10800		35000	C			No	BSL
85-68-7	Butylbenzyl phthalate	150		150		µg/kg	SS-16	1/9	340–720	150		1200000	N			No	BSL
86-74-8	Carbazole	72		72		µg/kg	SS-03	1/9	360–720	72		24000	C			No	BSL
132-64-9	Dibenzofuran	80		80		µg/kg	SS-03	1/9	360–720	80		29000	N			No	BSL
84-66-2	Diethyl phthalate	–		–		µg/kg		0/9	340–720	ND		4900000	N			No	IFD
131-11-3	Dimethyl phthalate	–		–		µg/kg		0/9	340–720	ND		6.1E+07	N			No	IFD
84-74-2	Di-n-butyl phthalate	1000		1000		µg/kg	SS-16	1/9	340–720	1000		610000	N			No	BSL
117-84-0	Di-n-octyl phthalate	–		–		µg/kg		0/9	340–720	ND		240000	N			No	IFD
118-74-1	Hexachlorobenzene	–		–		µg/kg		0/9	340–720	ND		300	C			No	IFD
87-68-3	Hexachlorobutadiene	–		–		µg/kg		0/9	340–720	ND		1800	N			No	IFD
77-47-4	Hexachlorocyclopentadiene	–		–		µg/kg		0/9	340–720	ND		37000	N			No	IFD
67-72-1	Hexachloroethane	–		–		µg/kg		0/9	340–720	ND		6100	N			No	IFD
78-59-1	Isophorone	–		–		µg/kg		0/9	340–720	ND		510000	C			No	IFD
98-95-3	Nitrobenzene	–		–		µg/kg		0/9	340–720	ND		2000	N			No	IFD
621-64-7	N-nitroso-di-n-propylamine	–		–		µg/kg		0/9	340–720	ND		69	C			No	IFD
86-30-6	N-nitrosodiphenylamine	51		51		µg/kg	SS-03	1/9	360–720	51		99000	C			No	BSL
87-86-5	Pentachlorophenol	–		–		µg/kg		0/9	860–1800	ND		3000	C			No	IFD
108-95-2	Phenol	150		150		µg/kg	SS-05	1/9	340–480	150		3700000	N			No	BSL
71-55-6	1,1,1-Trichloroethane	–		–		µg/kg		0/9	10–14	ND		200000	N			No	IFD
79-34-5	1,1,2,2-Tetrachloroethane	–		–		µg/kg		0/9	10–14	ND		410	C			No	IFD
79-00-5	1,1,2-Trichloroethane	–		–		µg/kg		0/9	10–14	ND		730	C			No	IFD
75-34-3	1,1-Dichloroethane	–		–		µg/kg		0/9	10–14	ND		51000	N			No	IFD
75-35-4	1,1-Dichloroethene	–		–		µg/kg		0/9	10–14	ND		12400	N			No	IFD
107-06-2	1,2-Dichloroethane	–		–		µg/kg		0/9	10–14	ND		280	C			No	IFD
540-59-0	1,2-Dichloroethene isomers (total)	–		–		µg/kg		0/9	10–14	ND		4300	N[c]			No	IFD
78-87-5	1,2-Dichloropropane	–		–		µg/kg		0/9	10–14	ND		340	C			No	IFD
78-93-3	2-Butanone	5	J	7	J	µg/kg	SS-05	2/9	11–14	7		730000	N			No	BSL
591-78-6	2-Hexanone	–		–		µg/kg		0/9	10–14	ND		N/A				No	IFD
108-10-1	4-Methyl-2-pentanone	–		–		µg/kg		0/9	10–14	ND		79000	N			No	IFD
67-64-1	Acetone	8	J	8	J	µg/kg	SS-15	1/9	4–35	8		160000	N			No	BSL
71-43-2	Benzene	5		2800	J	µg/kg	MW-15	4/10	11–14	2800		650	C			Yes	ASL
75-27-4	Bromodichloromethane	–		–		µg/kg		0/9	10–14	ND		820	C			No	IFD
75-25-2	Bromoform	–		–		µg/kg		0/9	10–14	ND		62000	C			No	IFD
74-83-9	Bromomethane	–		–		µg/kg		0/9	10–14	ND		390	N			No	IFD
75-15-0	Carbon disulfide	–		–		µg/kg		0/9	10–14	ND		36000	N			No	IFD
56-23-5	Carbon tetrachloride	–		–		µg/kg		0/9	10–14	ND		210	N			No	IFD
108-90-7	Chlorobenzene	1.2	J	1.2	J	µg/kg	MW-15	1/10	10–14	1.2		15000	N			No	BSL
75-00-3	Chloroethane	–		–		µg/kg		0/9	10–14	ND		3000	C			No	IFD
67-66-3	Chloroform	–		–		µg/kg		0/9	10–14	ND		360	N			No	IFD
74-87-3	Chloromethane	–		–		µg/kg		0/9	10–14	ND		1200	C			No	IFD
10061-01-5	cis-1,3-Dichloropropene	–		–		µg/kg		0/9	10–14	ND		780	C			No	IFD
124-48-1	Dibromochloromethane	–		–		µg/kg		0/9	10–14	ND		1100	C			No	IFD

Table 2.2
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
100-41-4	Ethylbenzene	–		–		µg/kg		0/9	10–14	ND		8900	C			No	IFD
136777-61-2	meta & para Xylenes	17	J	17	J	µg/kg	MW-15	1/1	–	17		N/A				No	NTX
75-09-2	Methylene chloride	–		–		µg/kg		0/9	3–14	ND		9100	C			No	IFD
95-47-6	ortho-Xylene	20	J	20	J	µg/kg	MW-15	1/1	–	20		N/A				No	NTX
100-42-5	Styrene	–		–		µg/kg		0/9	10–14	ND		440000	N			No	IFD
127-18-4	Tetrachloroethene	–		–		µg/kg		0/9	10–14	ND		1500	C			No	IFD
108-88-3	Toluene	11	J	11	J	µg/kg	MW-15	1/10	10–14	11		66000	N			No	BSL
10061-02-6	trans-1,3-Dichloropropene	–		–		µg/kg		0/9	10–14	ND		780	C			No	IFD
79-01-6	Trichloroethene	2		2		µg/kg	SS-04	1/9	10–14	2		53	C			No	BSL
75-01-4	Vinyl chloride	–		–		µg/kg		0/9	10–14	ND		79	C			No	IFD
1330-20-7	Xylene isomers (total)	–		–		µg/kg		0/9	10–14	ND		28000	N			No	IFD
	PAHs																
91-57-6	2-Methylnaphthalene	60		190		µg/kg	SS-03	3/9	360–720	190		5600	N[d]			No	BSL
83-32-9	Acenaphthene	40		230		µg/kg	SS-14	6/9	360–480	230		370000	N			No	BSL
208-96-8	Acenaphthylene	53		69		µg/kg	SS-03	2/9	360–720	69		5600	N[d]			No	BSL
120-12-7	Anthracene	40		460		µg/kg	SS-03	7/9	370–400	460		2200000	N			No	BSL
56-55-3	Benz[a]anthracene	150		1400		µg/kg	SS-03	10/12	370–400	1400		620	C			Yes	ASL
50-32-8	Benzo[a]pyrene	120		1100		µg/kg	SS-03	10/12	370–400	1100		62	C			Yes	ASL
205-99-2	Benzo[b]fluoranthene	73		1400		µg/kg	SS-03	11/12	370–370	1400		620	C			Yes	ASL
191-24-2	Benzo[ghi]perylene	96		520		µg/kg	SS-03	7/9	370–400	520		5600	N[d]			No	BSL
207-08-9	Benzo[k]fluoranthene	51		565	J	µg/kg	WS-18	11/12	400–400	565		6200	C			No	BSL
218-01-9	Chrysene	56		1400		µg/kg	SS-03	8/9	370–370	1400		62000	C			No	BSL
53-70-3	Dibenz[a,h]anthracene	50		150		µg/kg	SS-03	6/12	170–400	150		62	C			Yes	ASL
206-44-0	Fluoranthene	94		2600		µg/kg	SS-03	9/9	–	2600		230000	N			No	BSL
86-73-7	Fluorene	41		370		µg/kg	SS-14	7/9	370–480	370		270000	N			No	BSL
193-39-5	Indeno[1,2,3-cd]pyrene	75		470		µg/kg	SS-03	10/12	370–400	470		620	C			No	BSL
91-20-3	Naphthalene	92		94		µg/kg	SS-03	2/9	360–720	94		5600	N			No	BSL
85-01-8	Phenanthrene	160		2500		µg/kg	SS-03	7/9	370–400	2500		230000	N[e]			No	BSL
129-00-0	Pyrene	43		2600		µg/kg	SS-03	9/9	–	2600		230000	N			No	BSL

Note: All results reported as dry weight.
For the purposes of screening, field replicates have been averaged.

– - either no detected or undetected values
ARAR - applicable or relevant and appropriate requirement
C - carcinogenic based on a cancer risk of 1×10^{-6}
CoPC - chemical of potential concern
J - estimated value
N - noncarcinogenic based on hazard quotient of 0.1
N/A - not applicable
ND - not detected
PAH - polycyclic aromatic hydrocarbon
PRG - preliminary remediation goal
Q - qualifier
TBC - to be considered

Rationale Codes:

Selection Reason:
ASL - above screening levels
HIST - infrequent detection but associated historically

Deletion Reason:
BKG - below or consistent with background levels
BSL - below screening level
IFD - infrequent detection
NTX - no toxicity information
NUT - essential nutrient

[a] Screening toxicity values for soil are the PRGs taken from U.S. EPA Region IX (2003a). PRGs correspond to 1×10^{-6} or a hazard quotient of 0.1, whichever is lower.
[b] This default non-carcinogenic screening value for chromium is that for chromium(VI).
[c] This default non-carcinogenic screening value is that for *cis*-1,2-dichloroethene.
[d] This default screening value is that for naphthalene, the noncarcinogenic PAH with the most stringent risk-based concentration/PRG.
[e] Based on the risk-based concentration for pyrene. There is no EPA-derived toxicity value for phenanthrene. NJDEP and EPA indicated that the toxicity value for pyrene should be applied (NJDEP 2001).

Table 2.3
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

Scenario Timeframe	Current/Future
Medium:	Sediment
Exposure Medium:	Surface sediment
Exposure Point:	Undeveloped area surface sediment

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
	INORGANIC ANALYTES																
7429-90-5	Aluminum	5800		13900		mg/kg	SD-09	2/2	-	13900	N/A	7600	N			**Yes**	ASL
7440-36-0	Antimony	-		-		mg/kg		0/2	1.8-3.2	ND	0.05	3.1	N			No	IFD
7440-38-2	Arsenic	2.6		8.8		mg/kg	SD-09	5/5	-	8.8	10.7	0.39	C			**Yes**	ASL
7440-39-3	Barium	72.1		226		mg/kg	SD-11	5/5	-	226	N/A	540	N			No	BSL
7440-41-7	Beryllium	0.83		0.83		mg/kg	SD-09	1/2	0.39-0.39	0.83	1.16	15	N			No	BSL
7440-43-9	Cadmium	0.9	J	9.1		mg/kg	SD-11	5/5	-	9.1	0.32	3.7	N			**Yes**	ASL
7440-70-2	Calcium	2050	J	3810		mg/kg	SD-09	2/2	-	3810	N/A	N/A	N			No	NTX
7440-47-3	Chromium	55.4	J	156		mg/kg	SD-11	5/5	-	156	18.7	22	N[b]			**Yes**	ASL
7440-48-4	Cobalt	4.7		9.8		mg/kg	SD-09	2/2	-	9.8	N/A	140	N			No	BSL
7440-50-8	Copper	94	J	194		mg/kg	SD-11	5/5	-	194	28.4	290	N			No	BSL
7439-89-6	Iron	8400	J	21400		mg/kg	SD-11	5/5	-	21400	N/A	2300	N			**Yes**	ASL
7439-92-1	Lead	188	J	469		mg/kg	SD-09	5/5	-	469	100	400	N			No	ASL[c]
7439-95-4	Magnesium	1680	J	3530		mg/kg	SD-09	2/2	-	3530	N/A	N/A				No	NTX
7439-96-5	Manganese	85.3	J	179		mg/kg	SD-09	5/5	-	179	846	180	N			No	BSL
7439-97-6	Mercury	18.95		1290		mg/kg	SD-12	7/7	-	1290	0.14	2.3	N			**Yes**	ASL
22967-92-6	Methyl mercury	11.91		126		ng/g	SD-08	5/5	-	126	N/A	610	N			**Yes**	HIST[d]
7440-02-0	Nickel	14.2		29.2		mg/kg	SD-10	5/5	-	29.2	14.9	160	N			No	BSL
7440-09-7	Potassium	524		1260		mg/kg	SD-09	2/2	-	1260	N/A	N/A				No	NTX
7782-49-2	Selenium	1		1.6		mg/kg	SD-10	3/5	1.3-2.2	1.6	0.17	39	N			No	BSL
7440-22-4	Silver	1.3		4.3		mg/kg	SD-12	3/5	0.16-0.18	4.3	0.26	39	N			No	BSL
7440-23-5	Sodium	-		-		mg/kg		0/2	658-1130	ND	N/A	N/A				No	IFD
7440-28-0	Thallium	1.8		4.8		mg/kg	SD-10	3/5	2.1-3.6	4.8	0.19	0.52	N			**Yes**	ASL
7440-62-2	Vanadium	44.2		69.4		mg/kg	SD-09	2/2	-	69.4	34.4	55	N			**Yes**	ASL
7440-66-6	Zinc	434		3540		mg/kg	SD-11	5/5	-	3540	82.6	2300	N			**Yes**	ASL
	ORGANIC ANALYTES																
	Petroleum hydrocarbons	60		60		mg/kg	SD-08	1/2	94-94	60		N/A				No	NTX
120-82-1	1,2,4-Trichlorobenzene	-		-		µg/kg		0/2	330-1600	ND		65000	N			No	IFD
95-50-1	1,2-Dichlorobenzene	-		-		µg/kg		0/2	330-1600	ND		110000	N			No	IFD
541-73-1	1,3-Dichlorobenzene	-		-		µg/kg		0/2	330-1600	ND		1600	N			No	IFD
106-46-7	1,4-Dichlorobenzene	-		-		µg/kg		0/2	330-1600	ND		3400	C			No	IFD
108-60-1	2,2'-Oxybis[1-chloropropane]	-		-		µg/kg		0/2	330-1600	ND		2900	C			No	IFD
95-95-4	2,4,5-Trichlorophenol	-		-		µg/kg		0/2	800-4000	ND		610000	N			No	IFD
88-06-2	2,4,6-Trichlorophenol	-		-		µg/kg		0/2	330-1600	ND		610	N			No	IFD
120-83-2	2,4-Dichlorophenol	-		-		µg/kg		0/2	330-1600	ND		18000	N			No	IFD
105-67-9	2,4-Dimethylphenol	-		-		µg/kg		0/2	330-1600	ND		120000	N			No	IFD
51-28-5	2,4-Dinitrophenol	-		-		µg/kg		0/2	800-4000	ND		12000	N			No	IFD
121-14-2	2,4-Dinitrotoluene	-		-		µg/kg		0/2	330-1600	ND		12000	N			No	IFD
606-20-2	2,6-Dinitrotoluene	-		-		µg/kg		0/2	330-1600	ND		6100	N			No	IFD
91-58-7	2-Chloronaphthalene	-		-		µg/kg		0/2	330-1600	ND		490000	N			No	IFD
95-57-8	2-Chlorophenol	-		-		µg/kg		0/2	330-1600	ND		6300	N			No	IFD

Table 2.3
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

Scenario Timeframe	Current/Future
Medium:	Sediment
Exposure Medium:	Surface sediment
Exposure Point:	Undeveloped area surface sediment

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
534-52-1	2-Methyl-4,6-dinitrophenol	–		–		µg/kg		0/2	800–4000	ND		N/A				No	IFD
95-48-7	2-Methylphenol	–		–		µg/kg		0/2	330–1600	ND		310000	N			No	IFD
88-74-4	2-Nitroaniline	–		–		µg/kg		0/2	800–4000	ND		170	N			No	IFD
88-75-5	2-Nitrophenol	–		–		µg/kg		0/2	330–1600	ND		N/A	N			No	IFD
91-94-1	3,3'-Dichlorobenzidine	–		–		µg/kg		0/2	330–1600	ND		1100	C			No	IFD
99-09-2	3-Nitroaniline	–		–		µg/kg		0/2	800–4000	ND		N/A				No	IFD
101-55-3	4-Bromophenyl-phenyl ether	–		–		µg/kg		0/2	330–1600	ND		N/A				No	IFD
59-50-7	4-Chloro-3-methylphenol	–		–		µg/kg		0/2	330–1600	ND		N/A				No	IFD
106-47-8	4-Chloroaniline	–		–		µg/kg		0/2	330–1600	ND		24000	N			No	IFD
7005-72-3	4-Chlorophenyl-phenyl ether	–		–		µg/kg		0/2	330–1600	ND		N/A				No	IFD
106-44-5	4-Methylphenol	–		–		µg/kg		0/2	330–1600	ND		31000	N			No	IFD
100-01-6	4-Nitroaniline	–		–		µg/kg		0/2	800–4000	ND		N/A				No	IFD
100-02-7	4-Nitrophenol	–		–		µg/kg		0/2	800–4000	ND		N/A				No	IFD
111-91-1	bis[2-chloroethoxy]methane	–		–		µg/kg		0/2	330–1600	ND		N/A				No	IFD
111-44-4	bis[2-chloroethyl]ether	–		–		µg/kg		0/2	330–1600	ND		210	C			No	IFD
117-81-7	bis[2-Ethylhexyl]phthalate	–		–		µg/kg		0/2	330–1500	ND		35000	C			No	IFD
85-68-7	Butylbenzyl phthalate	290		290		µg/kg	SD-08	1/2	1600–1600	290		1200000	N			No	BSL
86-74-8	Carbazole	150		210		µg/kg	SD-09	2/2	–	210		24000	C			No	BSL
132-64-9	Dibenzofuran	–		–		µg/kg		0/2	330–1600	ND		29000	N			No	IFD
84-66-2	Diethyl phthalate	–		–		µg/kg		0/2	330–1600	ND		4900000	N			No	IFD
131-11-3	Dimethyl phthalate	–		–		µg/kg		0/2	330–1600	ND		61000000	N			No	IFD
84-74-2	Di-n-butyl phthalate	160		160		µg/kg	SD-09	1/2	330–330	160		610000	N			No	BSL
117-84-0	Di-n-octyl phthalate	–		–		µg/kg		0/2	330–1600	ND		240000	N			No	IFD
118-74-1	Hexachlorobenzene	–		–		µg/kg		0/2	330–1600	ND		300	C			No	IFD
87-68-3	Hexachlorobutadiene	–		–		µg/kg		0/2	330–1600	ND		1800	N			No	IFD
77-47-4	Hexachlorocyclopentadiene	–		–		µg/kg		0/2	330–1600	ND		37000	N			No	IFD
67-72-1	Hexachloroethane	–		–		µg/kg		0/2	330–1600	ND		6100	N			No	IFD
78-59-1	Isophorone	–		–		µg/kg		0/2	330–1600	ND		510000	C			No	IFD
98-95-3	Nitrobenzene	–		–		µg/kg		0/2	330–1600	ND		2000	N			No	IFD
621-64-7	N-nitroso-di-n-propylamine	–		–		µg/kg		0/2	330–1600	ND		69	C			No	IFD
86-30-6	N-nitrosodiphenylamine	–		–		µg/kg		0/2	330–1600	ND		99000	C			No	IFD
87-86-5	Pentachlorophenol	–		–		µg/kg		0/2	800–4000	ND		3000	C			No	IFD
108-95-2	Phenol	–		–		µg/kg		0/2	330–1600	ND		3700000	N			No	IFD
71-55-6	1,1,1-Trichloroethane	–		–		µg/kg		0/2	28–48	ND		200000	N			No	IFD
79-34-5	1,1,2,2-Tetrachloroethane	–		–		µg/kg		0/2	28–48	ND		410	C			No	IFD
79-00-5	1,1,2-Trichloroethane	–		–		µg/kg		0/2	28–48	ND		730	C			No	IFD
75-34-3	1,1-Dichloroethane	–		–		µg/kg		0/2	28–48	ND		51000	N			No	IFD
75-35-4	1,1-Dichloroethene	–		–		µg/kg		0/2	28–48	ND		12400	N			No	IFD
107-06-2	1,2-Dichloroethane	–		–		µg/kg		0/2	28–48	ND		280	C			No	IFD
540-59-0	1,2-Dichloroethene isomers (total)	–		–		µg/kg		0/2	28–48	ND		4300	N[e]			No	IFD
78-87-5	1,2-Dichloropropane	–		–		µg/kg		0/2	28–48	ND		340	C			No	IFD

Table 2.3
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

Scenario Timeframe	Current/Future
Medium:	Sediment
Exposure Medium:	Surface sediment
Exposure Point:	Undeveloped area surface sediment

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
78-93-3	2-Butanone	–		–		µg/kg		0/2	28–48	ND		730000	N			No	IFD
591-78-6	2-Hexanone	–		–		µg/kg		0/2	28–48	ND		N/A				No	IFD
108-10-1	4-Methyl-2-pentanone	–		–		µg/kg		0/2	28–48	ND		79000	N			No	IFD
67-64-1	Acetone	190	J	190	J	µg/kg	SD-08	1/2	290–290	190		160000	N			No	BSL
71-43-2	Benzene	–		–		µg/kg		0/2	28–48	ND		650	C			No	IFD
75-27-4	Bromodichloromethane	–		–		µg/kg		0/2	28–48	ND		820	C			No	IFD
75-25-2	Bromoform	–		–		µg/kg		0/2	28–48	ND		62000	C			No	IFD
74-83-9	Bromomethane	–		–		µg/kg		0/2	28–48	ND		390	N			No	IFD
75-15-0	Carbon disulfide	–		–		µg/kg		0/2	28–48	ND		36000	N			No	IFD
56-23-5	Carbon tetrachloride	–		–		µg/kg		0/2	28–48	ND		210	N			No	IFD
108-90-7	Chlorobenzene	–		–		µg/kg		0/2	28–48	ND		15000	N			No	IFD
75-00-3	Chloroethane	–		–		µg/kg		0/2	28–48	ND		3000	C			No	IFD
67-66-3	Chloroform	–		–		µg/kg		0/2	28–48	ND		360	N			No	IFD
74-87-3	Chloromethane	–		–		µg/kg		0/2	28–48	ND		1200	C			No	IFD
10061-01-5	cis-1,3-Dichloropropene	–		–		µg/kg		0/2	28–48	ND		780	C			No	IFD
124-48-1	Dibromochloromethane	–		–		µg/kg		0/2	28–48	ND		1100	C			No	IFD
100-41-4	Ethylbenzene	–		–		µg/kg		0/2	28–48	ND		8900	C			No	IFD
75-09-2	Methylene chloride	–		–		µg/kg		0/2	28–48	ND		9100	C			No	IFD
100-42-5	Styrene	–		–		µg/kg		0/2	28–48	ND		440000	N			No	IFD
127-18-4	Tetrachloroethene	–		–		µg/kg		0/2	28–48	ND		1500	C			No	IFD
108-88-3	Toluene	–		–		µg/kg		0/2	28–48	ND		66000	N			No	IFD
10061-02-6	trans-1,3-Dichloropropene	–		–		µg/kg		0/2	28–48	ND		780	C			No	IFD
79-01-6	Trichloroethene	–		–		µg/kg		0/2	28–48	ND		53	C			No	IFD
75-01-4	Vinyl chloride	–		–		µg/kg		0/2	28–48	ND		79	C			No	IFD
1330-20-7	Xylene isomers (total)	–		–		µg/kg		0/2	28–48	ND		28000	N			No	IFD
	PAHs									0							
91-57-6	2-Methylnaphthalene	–		–		µg/kg		0/2	330–1600	ND		5600	N[f]			No	IFD
83-32-9	Acenaphthene	100		100		µg/kg	SD-08	1/5	810–1600	100		370000	N			No	BSL
208-96-8	Acenaphthylene	180		490		µg/kg	SD-12	2/5	330–1600	490		5600	N[f]			No	BSL
120-12-7	Anthracene	170		350		µg/kg	SD-09	5/5	–	350		2200000	N			No	BSL
56-55-3	Benz[a]anthracene	230		1700		µg/kg	SD-09	5/5	–	1700		620	C			**Yes**	ASL
50-32-8	Benzo[a]pyrene	300		1600		µg/kg	SD-09	5/5	–	1600		62	C			**Yes**	ASL
205-99-2	Benzo[b]fluoranthene	300		1800		µg/kg	SD-09	5/5	–	1800		620	C			**Yes**	ASL
191-24-2	Benzo[ghi]perylene	270		1200		µg/kg	SD-09	5/5	–	1200		5600	N[f]			No	BSL
207-08-9	Benzo[k]fluoranthene	280		660		µg/kg	SD-09	5/5	–	660		6200	C			No	BSL
218-01-9	Chrysene	330		1600		µg/kg	SD-09	5/5	–	1600		62000	C			No	BSL
53-70-3	Dibenz[a,h]anthracene	91		320		µg/kg	SD-09	5/5	–	490		62	C			**Yes**	ASL
206-44-0	Fluoranthene	510		2800	J	µg/kg	SD-09	5/5	–	2800		230000	N			No	BSL
86-73-7	Fluorene	110		170		µg/kg	SD-09	2/5	810–960	170		270000	N			No	BSL
193-39-5	Indeno[1,2,3-cd]pyrene	220		1200		µg/kg	SD-09	5/5	–	1200		620	C			**Yes**	ASL
91-20-3	Naphthalene	100		100		µg/kg	SD-10	1/5	330–1600	100		5600	N			No	BSL

Table 2.3
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

Scenario Timeframe	Current/Future
Medium:	Sediment
Exposure Medium:	Surface sediment
Exposure Point:	Undeveloped area surface sediment

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
85-01-8	Phenanthrene	180		1800		µg/kg	SD-09	5/5	–	1800		230000	N[g]			No	BSL
129-00-0	Pyrene	380		2900		µg/kg	SD-09	5/5	–	2900		230000	N			No	BSL
	PCBs									0							
12674-11-2	Aroclor® 1016	–		–		µg/kg		0/2	92–160	ND		390	N			No	IFD
11104-28-2	Aroclor® 1221	–		–		µg/kg		0/2	92–160	ND		220	C			No	IFD
11141-16-5	Aroclor® 1232	–		–		µg/kg		0/2	92–160	ND		220	C			No	IFD
53469-21-9	Aroclor® 1242	–		–		µg/kg		0/2	92–160	ND		220	C			No	IFD
12672-29-6	Aroclor® 1248	190		240		µg/kg	SD-08	2/2	–	240		220	C			**Yes**	ASL
11097-69-1	Aroclor® 1254	–		–		µg/kg		0/2	92–160	ND		110	N			No	IFD
11096-82-5	Aroclor® 1260	260		490		µg/kg	SD-08	2/2	–	490		220	C			**Yes**	ASL

Note: All results reported as dry weight.
For the purposes of screening, field replicates have been averaged.

– - either no detected or undetected values
ARAR - applicable or relevant and appropriate requirement
C - carcinogenic based on a cancer risk of 1×10^{-6}
CoPC - chemical of potential concern
J - estimated value
N - noncarcinogenic based on hazard quotient of 0.1
N/A - not applicable
ND - not detected
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
PRG - preliminary remediation goal
Q - qualifier
TBC - to be considered

Rationale Codes:

Selection Reason:
ASL - above screening levels
HIST - infrequent detection but associated historically

Deletion Reason:
BKG - below or consistent with background levels
BSL - below screening level
IFD - infrequent detection
NTX - no toxicity information
NUT - essential nutrient

[a] Screening toxicity values for soil/sediment are the PRGs taken from U.S. EPA Region IX (2003a). PRGs correspond to 1×10^{-6} or a hazard quotient of 0.1, whichever is lower.
[b] This default non-carcinogenic screening value for chromium is that for chromium(VI).
[c] Consistent with EPA model in puts for for lead, screening was based on the mean concentration of 279 mg/kg rather than a maximum value.
[d] Methylmercury is included as a CoPC at the request of the New Jersey Department of Environmental Protection and U.S. EPA Region II reviewers.
[e] This default non-carcinogenic screening value is that for *cis*-1,2-dichloroethene.
[f] This default screening value is that for naphthalene, the noncarcinogenic PAH with the most stringent risk-based concentration/PRG.
[g] Based on the risk-based concentration for pyrene. There is no EPA-derived toxicity value for phenanthrene. NJDEP and EPA indicated that the toxicity value for pyrene should be applied (NJDEP 2001).

Table 2.4
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

Scenario Timeframe	Current/Future
Medium:	Soil
Exposure Medium:	Surface soil
Exposure Point:	Undeveloped area surface soil

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
	INORGANIC ANALYTES																
7429-90-5	Aluminum	25.4		11000		mg/kg	SS-29	31/31	–	11000	N/A	7600	N			Yes	ASL
7440-36-0	Antimony	0.52		53.7		mg/kg	SS-11	21/31	0.219–0.96	53.7	0.05	3.1	N			Yes	ASL
7440-38-2	Arsenic	1.6	J	26.4		mg/kg	MW-14	23/32	0.222–53.3	26.4	10.7	0.39	C			Yes	ASL
7440-39-3	Barium	4.4		12000		mg/kg	HS-02	31/32	0.452–0.452	12000	N/A	540	N			Yes	ASL
7440-41-7	Beryllium	0.35		0.35		mg/kg	SS-22	1/31	0.0441–0.68	0.35	1.16	15	N			No	BSL
7440-43-9	Cadmium	0.25	J	31.1		mg/kg	HS-05	20/32	0.0626–3.4	31.1	0.32	3.7	N			Yes	ASL
7440-70-2	Calcium	170		202000		mg/kg	TP-04	29/31	532–664	202000	N/A	N/A	N			No	NTX
7440-47-3	Chromium	0.931		8230		mg/kg	HS-06	33/33	–	8230	18.7	22	N[b]			Yes	ASL
7440-48-4	Cobalt	2.3		14.4		mg/kg	SS-27	26/31	0.0812–1.6	14.4	N/A	140	N			No	BSL
7440-50-8	Copper	2.73		1010	J	mg/kg	SS-24	33/33	–	1010	28.4	290	N			Yes	ASL
57-12-5	Cyanide	–		–		mg/kg		0/3	1.13–2.04	ND	N/A	1.1	N			No	IFD
7439-89-6	Iron	212		122000	J	mg/kg	SS-27	32/32	–	122000	N/A	2300	N			Yes	ASL
7439-92-1	Lead	7.93		47600		mg/kg	HS-06	31/32	1.04–1.04	47600	100	400	N			Yes	ASL[c]
7439-95-4	Magnesium	17.7		14700		mg/kg	TP-04	31/31	–	14700	N/A	N/A				No	NTX
7439-96-5	Manganese	3.19		3090	J	mg/kg	SS-24	32/32	–	3090	846	180	N			Yes	ASL
7439-97-6	Mercury	0.331		295000	J	mg/kg	HS-05	40/40	–	295000	0.14	2.3	N			Yes	ASL
22967-92-6	Methyl mercury	0.59		322		ng/g	SS-20	9/9	–	322	N/A	610	N			Yes	HIST[d]
7440-02-0	Nickel	0.538		193		mg/kg	TP-01	30/33	0.512–15.3	193	14.9	160	N			Yes	ASL
7440-09-7	Potassium	16.9		922		mg/kg	TP-01	29/31	22.6–42	922	N/A	N/A				No	NTX
7782-49-2	Selenium	0.82		2		mg/kg	TP-01	11/32	0.334–2.4	2	0.17	39	N			No	BSL
7440-22-4	Silver	0.18		93.8		mg/kg	TP-01	26/33	0.0545–0.5	93.8	0.26	39	N			Yes	ASL
7440-23-5	Sodium	271		2580		mg/kg	TP-01	5/31	49.9–4670	2580	N/A	N/A				No	NTX
18496-25-8	Sulfides	–		–		mg/kg		0/3	2.3–4.1	ND	N/A	N/A	N			No	IFD
7440-28-0	Thallium	5.8	J	21.9		mg/kg	TP-01	4/33	0.415–2.3	21.9	0.19	0.52	N			Yes	ASL
7440-62-2	Vanadium	0.9		245		mg/kg	TP-01	30/32	0.108–0.353	245	34.4	55	N			Yes	ASL
7440-66-6	Zinc	3.93		188000		mg/kg	TP-01	27/33	40.9–476	188000	82.6	2300	N			Yes	ASL
	ORGANIC ANALYTES																
120-82-1	1,2,4-Trichlorobenzene	–		–		µg/kg		0/27	200–23000	ND		65000	N			No	IFD
95-50-1	1,2-Dichlorobenzene	–		–		µg/kg		0/27	200–23000	ND		110000	N			No	IFD
541-73-1	1,3-Dichlorobenzene	–		–		µg/kg		0/27	200–23000	ND		1600	N			No	IFD
106-46-7	1,4-Dichlorobenzene	–		–		µg/kg		0/27	200–23000	ND		3400	C			No	IFD
108-60-1	2,2'-Oxybis[1-chloropropane]	–		–		µg/kg		0/27	200–23000	ND		2900	C			No	IFD
95-95-4	2,4,5-Trichlorophenol	–		–		µg/kg		0/27	870–400000	ND		610000	N			No	IFD
88-06-2	2,4,6-Trichlorophenol	–		–		µg/kg		0/27	350–77000	ND		610	N			No	IFD
120-83-2	2,4-Dichlorophenol	–		–		µg/kg		0/27	350–77000	ND		18000	N			No	IFD
105-67-9	2,4-Dimethylphenol	–		–		µg/kg		0/27	350–77000	ND		120000	N			No	IFD
51-28-5	2,4-Dinitrophenol	–		–		µg/kg		0/27	870–400000	ND		12000	N			No	IFD
121-14-2	2,4-Dinitrotoluene	–		–		µg/kg		0/27	200–23000	ND		12000	N			No	IFD
606-20-2	2,6-Dinitrotoluene	–		–		µg/kg		0/27	200–23000	ND		6100	N			No	IFD
91-58-7	2-Chloronaphthalene	–		–		µg/kg		0/27	200–23000	ND		490000	N			No	IFD
95-57-8	2-Chlorophenol	–		–		µg/kg		0/27	350–77000	ND		6300	N			No	IFD
534-52-1	2-Methyl-4,6-dinitrophenol	–		–		µg/kg		0/27	870–400000	ND		N/A				No	IFD
95-48-7	2-Methylphenol	–		–		µg/kg		0/27	350–77000	ND		310000	N			No	IFD
88-74-4	2-Nitroaniline	–		–		µg/kg		0/27	870–400000	ND		170	N			No	IFD

Table 2.4
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
88-75-5	2-Nitrophenol	–		–		µg/kg		0/27	350–77000	ND		N/A	N			No	IFD
91-94-1	3,3'-Dichlorobenzidine	–		–		µg/kg		0/27	200–23000	ND		1100	C			No	IFD
99-09-2	3-Nitroaniline	–		–		µg/kg		0/27	870–400000	ND		N/A				No	IFD
101-55-3	4-Bromophenyl-phenyl ether	–		–		µg/kg		0/27	200–23000	ND		N/A				No	IFD
59-50-7	4-Chloro-3-methylphenol	–		–		µg/kg		0/27	200–23000	ND		N/A				No	IFD
106-47-8	4-Chloroaniline	–		–		µg/kg		0/27	200–23000	ND		24000	N			No	IFD
7005-72-3	4-Chlorophenyl-phenyl ether	–		–		µg/kg		0/27	200–23000	ND		N/A				No	IFD
106-44-5	4-Methylphenol	–		–		µg/kg		0/27	350–77000	ND		31000	N			No	IFD
100-01-6	4-Nitroaniline	–		–		µg/kg		0/27	870–400000	ND		N/A	N			No	IFD
100-02-7	4-Nitrophenol	–		–		µg/kg		0/27	870–400000	ND		49000				No	IFD
65-85-0	Benzoic acid	0.11		0.11		mg/kg	MW-7	1/1	–	0.11		24000	N			No	BSL
111-91-1	bis[2-chloroethoxy]methane	–		–		µg/kg		0/27	200–23000	ND		N/A				No	IFD
111-44-4	bis[2-chloroethyl]ether	–		–		µg/kg		0/27	200–23000	ND		210	C			No	IFD
117-81-7	bis[2-Ethylhexyl]phthalate	110		380000		µg/kg	SS-18	15/28	79–23000	380000		35000	C			Yes	ASL
85-68-7	Butylbenzyl phthalate	80		1500		µg/kg	SS-24	7/27	200–23000	1500		1200000	N			No	BSL
86-74-8	Carbazole	39		930		µg/kg	SS-29	10/27	200–23000	930		24000	C			No	BSL
132-64-9	Dibenzofuran	37		640		µg/kg	SS-29	5/28	200–23000	640		29000	N			No	BSL
84-66-2	Diethyl phthalate	120		770		µg/kg	SS-24	5/27	200–23000	770		4900000	N			No	BSL
131-11-3	Dimethyl phthalate	65		2000		µg/kg	SS-17	2/27	200–23000	2000		61000000	N			No	BSL
84-74-2	Di-n-butyl phthalate	48		56000		µg/kg	TP-01	18/27	200–7200	56000		610000	N			No	BSL
117-84-0	Di-n-octyl phthalate	280		38000		µg/kg	SS-18	2/27	200–23000	38000		240000	N			No	BSL
118-74-1	Hexachlorobenzene	–		–		µg/kg		0/27	200–23000	ND		300	C			No	IFD
87-68-3	Hexachlorobutadiene	–		–		µg/kg		0/27	200–23000	ND		1800	N			No	IFD
77-47-4	Hexachlorocyclopentadiene	–		–		µg/kg		0/27	200–23000	ND		37000	N			No	IFD
67-72-1	Hexachloroethane	–		–		µg/kg		0/27	200–23000	ND		6100	N			No	IFD
78-59-1	Isophorone	–		–		µg/kg		0/27	200–23000	ND		510000	C			No	IFD
98-95-3	Nitrobenzene	–		–		µg/kg		0/27	200–23000	ND		2000	N			No	IFD
621-64-7	N-nitroso-di-n-propylamine	–		–		µg/kg		0/27	200–23000	ND		69	C			No	IFD
86-30-6	N-nitrosodiphenylamine	130		130		µg/kg	TP-01	1/27	200–23000	130		99000	C			No	BSL
87-86-5	Pentachlorophenol	–		–		µg/kg		0/27	870–400000	ND		3000	C			No	IFD
108-95-2	Phenol	79		250		µg/kg	TP-01	2/27	350–77000	250		3700000	N			No	BSL
	Phenols	5.08		9.07		mg/kg	TP-01	2/3	4.9–4.9	9.07		N/A	N			No	NTX
71-55-6	1,1,1-Trichloroethane	–		–		µg/kg		0/27	10–7200	ND		200000	N			No	IFD
79-34-5	1,1,2,2-Tetrachloroethane	–		–		µg/kg		0/27	10–7200	ND		410	C			No	IFD
79-00-5	1,1,2-Trichloroethane	–		–		µg/kg		0/27	10–7200	ND		730	C			No	IFD
75-34-3	1,1-Dichloroethane	–		–		µg/kg		0/27	10–7200	ND		51000	N			No	IFD
75-35-4	1,1-Dichloroethene	–		–		µg/kg		0/27	10–7200	ND		12400	N			No	IFD
107-06-2	1,2-Dichloroethane	–		–		µg/kg		0/27	10–7200	ND		280	C			No	IFD
540-59-0	1,2-Dichloroethene isomers (total)	–		–		µg/kg		0/26	10–7200	ND		4300	N[a]			No	IFD
78-87-5	1,2-Dichloropropane	–		–		µg/kg		0/27	10–7200	ND		340	C			No	IFD
78-93-3	2-Butanone	–		–		µg/kg		0/27	10–14000	ND		730000	N			No	IFD
591-78-6	2-Hexanone	–		–		µg/kg		0/27	10–14000	ND		N/A				No	IFD
108-10-1	4-Methyl-2-pentanone	870		870		µg/kg	TP-13	1/27	10–14000	870		79000	N			No	BSL
67-64-1	Acetone	3800		12000		µg/kg	TP-01	2/27	2–20	12000		160000	N			No	BSL
71-43-2	Benzene	3.6	J	3.6	J	µg/kg	MW-14	1/28	10–7200	3.6		650	C			No	BSL
75-27-4	Bromodichloromethane	–		–		µg/kg		0/27	10–7200	ND		820	C			No	IFD
75-25-2	Bromoform	–		–		µg/kg		0/27	10–7200	ND		62000	C			No	IFD
74-83-9	Bromomethane	–		–		µg/kg		0/27	10–14000	ND		390	N			No	IFD
75-15-0	Carbon disulfide	–		–		µg/kg		0/27	10–7200	ND		36000	N			No	IFD
56-23-5	Carbon tetrachloride	–		–		µg/kg		0/27	10–7200	ND		210	N			No	IFD
108-90-7	Chlorobenzene	–		–		µg/kg		0/28	6.3–7200	ND		15000	N			No	IFD

Table 2.4
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
75-00-3	Chloroethane	–		–		µg/kg		0/27	10–14000	ND		3000	C			No	IFD
67-66-3	Chloroform	–		–		µg/kg		0/27	10–7200	ND		360	N			No	IFD
74-87-3	Chloromethane	–		–		µg/kg		0/27	10–14000	ND		1200	C			No	IFD
156-59-2	cis-1,2-Dichloroethene	–		–		µg/kg		0/1	1300–1300	ND		4300	N			No	IFD
10061-01-5	cis-1,3-Dichloropropene	–		–		µg/kg		0/27	10–7200	ND		780	C			No	IFD
124-48-1	Dibromochloromethane	–		–		µg/kg		0/26	10–7200	ND		1100	C			No	IFD
100-41-4	Ethylbenzene	–		–		µg/kg		0/27	10–7200	ND		8900	C			No	IFD
136777-61-2	meta & para Xylenes	1.3	J	1.3	J	µg/kg	MW-14	1/1	–	1.3		N/A				No	NTX
75-09-2	Methylene chloride	–		–		µg/kg		0/27	3–7200	ND		9100	C			No	IFD
95-47-6	ortho-Xylene	–		–		µg/kg		0/1	6.3–6.3	ND		N/A				No	IFD
100-42-5	Styrene	–		–		µg/kg		0/27	10–7200	ND		440000	N			No	IFD
127-18-4	Tetrachloroethene	–		–		µg/kg		0/27	10–7200	ND		1500	C			No	IFD
108-88-3	Toluene	2.2	J	7000		µg/kg	TP-01	2/28	10–7200	7000		66000	N			No	BSL
156-60-5	trans-1,2-Dichloroethene	–		–		µg/kg		0/1	1300–1300	ND		6900	N			No	IFD
10061-02-6	trans-1,3-Dichloropropene	–		–		µg/kg		0/27	10–7200	ND		780	C			No	IFD
79-01-6	Trichloroethene	–		–		µg/kg		0/27	10–7200	ND		53	C			No	IFD
75-01-4	Vinyl chloride	–		–		µg/kg		0/27	10–14000	ND		79	C			No	IFD
1330-20-7	Xylene isomers (total)	5100		5100		µg/kg	TP-01	1/27	10–1300	5100		28000	N			No	BSL
	PAHs																
91-57-6	2-Methylnaphthalene	36		15000		µg/kg	TP-01	5/28	200–7200	15000		5600	N[f]			Yes	ASL
83-32-9	Acenaphthene	45		1200		µg/kg	SS-29	9/28	200–23000	1200		370000	N			No	BSL
208-96-8	Acenaphthylene	44		99		µg/kg	SS-12	6/28	200–23000	99		5600	N[f]			No	BSL
120-12-7	Anthracene	45		4100		µg/kg	SS-29	17/28	200–23000	4100		2200000	N			No	BSL
56-55-3	Benz[a]anthracene	78		4000		µg/kg	SS-17	22/27	200–23000	4000		620	C			Yes	ASL
50-32-8	Benzo[a]pyrene	73		10000		µg/kg	SS-29	23/28	200–23000	10000		62	C			Yes	ASL
205-99-2	Benzo[b]fluoranthene	160		13000		µg/kg	SS-29	20/28	200–23000	13000		620	C			Yes	ASL
191-24-2	Benzo[ghi]perylene	48		2200		µg/kg	SS-29	22/27	200–23000	2200		5600	N[f]			No	BSL
207-08-9	Benzo[k]fluoranthene	68		4700		µg/kg	SS-29	19/27	200–23000	4700		6200	C			No	BSL
218-01-9	Chrysene	90		12000		µg/kg	SS-29	23/28	200–23000	12000		62000	C			No	BSL
53-70-3	Dibenz[a,h]anthracene	44		900		µg/kg	SS-29	16/27	200–23000	900		62	C			Yes	ASL
206-44-0	Fluoranthene	120		26000		µg/kg	SS-29	23/28	200–23000	26000		230000	N			No	BSL
86-73-7	Fluorene	55		1100		µg/kg	SS-29	9/28	200–23000	1100		270000	N			No	BSL
193-39-5	Indeno[1,2,3-cd]pyrene	57		2600		µg/kg	SS-29	21/27	200–23000	2600		620	C			Yes	ASL
91-20-3	Naphthalene	62		120000		µg/kg	TP-01	7/27	200–7200	120000		5600	N			Yes	ASL
85-01-8	Phenanthrene	59		16000		µg/kg	TP-01	24/28	200–7200	16000		230000	N[g]			No	BSL
129-00-0	Pyrene	42		24000		µg/kg	TP-01	24/28	200–23000	24000		230000	N			No	BSL
	PCBs																
12674-11-2	Aroclor® 1016	–		–		µg/kg		0/3	68–1400	ND		390	N			No	IFD
11104-28-2	Aroclor® 1221	–		–		µg/kg		0/3	68–1400	ND		220	C			No	IFD
11141-16-5	Aroclor® 1232	–		–		µg/kg		0/3	68–1400	ND		220	C			No	IFD
53469-21-9	Aroclor® 1242	–		–		µg/kg		0/3	68–1400	ND		220	C			No	IFD
12672-29-6	Aroclor® 1248	4400		4400		µg/kg	MW-7	1/4	68–1400	4400		220	C			Yes	ASL
11097-69-1	Aroclor® 1254	–		–		µg/kg		0/3	68–1400	ND		110	N			No	IFD
11096-82-5	Aroclor® 1260	–		–		µg/kg		0/3	68–1400	ND		220	C			No	IFD
	PESTICIDES																
72-54-8	4,4'-DDD	–		–		µg/kg		0/3	6.8–140	ND		2400	C			No	IFD
72-55-9	4,4'-DDE	–		–		µg/kg		0/3	6.8–140	ND		1700	C			No	IFD
50-29-3	4,4'-DDT	–		–		µg/kg		0/3	6.8–140	ND		1700	C			No	IFD
309-00-2	Aldrin	–		–		µg/kg		0/3	3.4–73	ND		29	C			No	IFD
5103-71-9	alpha-Chlordane	–		–		µg/kg		0/3	3.4–73	ND		1600	C			No	IFD

Table 2.4
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
959-98-8	alpha-Endosulfan	–		–		µg/kg		0/3	3.4–73	ND		37000	N[h]			No	IFD
319-84-6	alpha-Hexachlorocyclohexane	–		–		µg/kg		0/3	3.4–73	ND		90	C			No	IFD
33213-65-9	beta-Endosulfan	–		–		µg/kg		0/3	6.8–140	ND		37000	N[h]			No	IFD
319-85-7	beta-Hexachlorocyclohexane	–		–		µg/kg		0/3	3.4–73	ND		320	C			No	IFD
319-86-8	delta-Hexachlorocyclohexane	–		–		µg/kg		0/3	3.4–73	ND		N/A				No	IFD
60-57-1	Dieldrin	–		–		µg/kg		0/3	6.8–140	ND		30	C			No	IFD
1031-07-8	Endosulfan sulfate	–		–		µg/kg		0/3	6.8–140	ND		37000	N[h]			No	IFD
72-20-8	Endrin	–		–		µg/kg		0/3	6.8–140	ND		1800	N			No	IFD
7421-93-4	Endrin aldehyde	–		–		µg/kg		0/3	6.8–140	ND		1800	N[i]			No	IFD
53494-70-5	Endrin ketone	–		–		µg/kg		0/3	6.8–140	ND		1800	N[i]			No	IFD
5103-74-2	gamma-Chlordane	–		–		µg/kg		0/3	3.4–73	ND		1600	C			No	IFD
58-89-9	gamma-Hexachlorocyclohexane	–		–		µg/kg		0/3	3.4–73	ND		440	C			No	IFD
76-44-8	Heptachlor	–		–		µg/kg		0/3	3.4–73	ND		110	C			No	IFD
1024-57-3	Heptachlor epoxide	–		–		µg/kg		0/3	3.4–73	ND		53	C			No	IFD
72-43-5	Methoxychlor	–		–		µg/kg		0/3	34–730	ND		31000	N			No	IFD
8001-35-2	Toxaphene	–		–		µg/kg		0/3	140–2900	ND		440	C			No	IFD

Note: All results reported as dry weight.
For the purposes of screening, field replicates have been averaged.

– - either no detected or undetected values
ARAR - applicable or relevant and appropriate requirement
C - carcinogenic based on a cancer risk of 1×10^{-6}
CoPC - chemical of potential concern
J - estimated value
N - noncarcinogenic based on hazard quotient of 0.1
N/A - not applicable
ND - not detected
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
PRG - preliminary remediation goal
Q - qualifier
TBC - to be considered

Rationale Codes:

Selection Reason:
ASL - above screening levels
HIST - infrequent detection but associated historically

Deletion Reason:
BKG - below or consistent with background levels
BSL - below screening level
IFD - infrequent detection
NTX - no toxicity information
NUT - essential nutrient

[a] Screening toxicity values for soil/sediment are the PRGs taken from U.S. EPA Region IX (2003a). PRGs correspond to 1×10^{-6} or a hazard quotient of 0.1, whichever is lower.
[b] This default non-carcinogenic screening value for chromium is that for chromium(VI).
[c] Consistent with EPA model in puts for for lead, screening was based on a the mean concentration of 2,110 mg/kg rather than a maximum value.
[d] Methylmercury is included as a CoPC at the request of the New Jersey Department of Environmental Protection and U.S. EPA Region II reviewers.
[e] This default non-carcinogenic screening value is that for *cis*-1,2-dichloroethene.
[f] This default screening value is that for naphthalene, the noncarcinogenic PAH with the most stringent risk-based concentration/PRG.
[g] Based on the risk-based concentration for pyrene. There is no EPA-derived toxicity value for phenanthrene. NJDEP and EPA indicated that the toxicity value for pyrene should be applied (NJDEP 2001).
[h] This default non-carcinogenic screening value is that for *endosulfan*
[i] This default non-carcinogenic screening value is that for *endrin*.

Table 2.5

Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Subsurface soil
Exposure Point:	Developed area subsurface soil (1-20 ft depths)

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
	INORGANIC ANALYTES																
7440-38-2	Arsenic	3.8		9.9		mg/kg	MW-13	4/4	–	9.9	10.7	0.39	C			Yes	ASL
7440-39-3	Barium	59.5		818		mg/kg	MW-13	4/4	–	818	N/A	540	N			Yes	ASL
7440-43-9	Cadmium	0.4		3.4		mg/kg	MW-15	4/4	–	3.4	0.32	3.7	N			No	BSL
7440-47-3	Chromium	10.3		131		mg/kg	MW-15	4/4	–	131	18.7	22	N[b]			Yes	ASL
7440-50-8	Copper	23.4		7420		mg/kg	MW-15	5/5	–	7420	28.4	290	N			Yes	ASL
7439-89-6	Iron	12000		35400		mg/kg	MW-13	4/4	–	35400	N/A	2300	N			Yes	ASL
7439-92-1	Lead	5		307		mg/kg	MW-15	4/4	–	307	100	400	N			No	BSL
7439-96-5	Manganese	241		812		mg/kg	MW-13	4/4	–	812	846	180	N			Yes	ASL
7439-97-6	Mercury	0.42		5150		mg/kg	MW-13	31/31	–	5150	0.14	2.3	N			Yes	ASL
7440-02-0	Nickel	9.7	J	87.8		mg/kg	MW-15	4/4	–	87.8	14.9	160	N			No	BSL
7782-49-2	Selenium	1.1		1.3		mg/kg	MW-13	3/4	0.43–0.43	1.3	0.17	39	N			No	BSL
7440-22-4	Silver	2.7		9.6		mg/kg	MW-15	2/4	0.08–0.08	9.6	0.26	39	N			No	BSL
7440-28-0	Thallium	0.9		5.4		mg/kg	MW-15	2/4	0.5–0.51	5.4	0.19	0.52	N			Yes	ASL
7440-66-6	Zinc	26.8		2110		mg/kg	MW-15	4/4	–	2110	82.6	2300	N			No	BSL
	ORGANIC ANALYTES																
65-85-0	Benzoic acid	0.12		0.14		mg/kg	MW-9	2/2	–	0.14		24000	N			No	BSL
117-81-7	bis[2-Ethylhexyl]phthalate	0.096		7.9		mg/kg	MW-9	8/8	–	7.9		35	C			No	BSL
85-68-7	Butylbenzyl phthalate	0.073		0.073		mg/kg	MW-9	1/1	–	0.073		1200	N			No	BSL
132-64-9	Dibenzofuran	2.3		2.3		mg/kg	MW-9	1/1	–	2.3		29	N			No	BSL
84-74-2	Di-n-butyl phthalate	0.33		3.3		mg/kg	MW-9	7/7	–	3.3		610	N			No	BSL
108-95-2	Phenol	0.89		0.89		mg/kg	MW-8	1/1	–	0.89		3700	N			No	BSL
71-43-2	Benzene	1.5		2800	J	µg/kg	MW-15	4/4	–	2800		650	C			Yes	ASL
108-90-7	Chlorobenzene	1.2	J	1.2	J	µg/kg	MW-15	1/4	5.2–6.1	1.2		15000	N			No	BSL
100-41-4	Ethylbenzene	0.91		0.91		mg/kg	MW-9	1/1	–	0.91		8.9	C			No	BSL
136777-61-2	meta & para Xylenes	4.1	J	17	J	µg/kg	MW-15	2/4	5.2–5.5	17		N/A				No	NTX
95-47-6	ortho-Xylene	20	J	20	J	µg/kg	MW-15	1/4	5.2–6.1	20		N/A				No	NTX
108-88-3	Toluene	4	J	11	J	µg/kg	MW-15	2/4	5.2–5.5	11		66000	N			No	BSL
	PAHs																
91-57-6	2-Methylnaphthalene	11		11		mg/kg	MW-9	1/1	–	11		5.6	N[c]			Yes	ASL
56-55-3	Benz[a]anthracene	0.26		0.26		mg/kg	MW-10	1/1	–	0.26		0.62	C			No	BSL
218-01-9	Chrysene	0.049		0.33		mg/kg	MW-10	2/2	–	0.33		62	C			No	BSL
206-44-0	Fluoranthene	0.023		0.44		mg/kg	MW-9	3/3	–	0.44		230	N			No	BSL
86-73-7	Fluorene	3.4		3.4		mg/kg	MW-9	1/1	–	3.4		270	N			No	BSL
91-20-3	Naphthalene	2.4		2.4		mg/kg	MW-9	1/1	–	2.4		5.6	N			No	BSL
85-01-8	Phenanthrene	0.15		5.5		mg/kg	MW-9	2/2	–	5.5		230	N[d]			No	BSL
129-00-0	Pyrene	0.049		0.26		mg/kg	MW-9	3/3	–	0.26		230	N			No	BSL
	PCBs																
11096-82-5	Aroclor® 1260	0.36		0.36		mg/kg	MW-9	1/1	–	0.36		0.22	C			Yes	ASL

Table 2.5
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

Note: All results reported as dry weight.
For the purposes of screening, field replicates have been averaged.

- -- either no detected or undetected values
- ARAR - applicable or relevant and appropriate requirement
- C - carcinogenic based on a cancer risk of 1×10^{-6}
- CoPC - chemical of potential concern
- J - estimated value
- N - noncarcinogenic based on hazard quotient of 0.1
- N/A - not applicable
- ND - not detected
- PAH - polycyclic aromatic hydrocarbon
- PCB - polychlorinated biphenyl
- PRG - preliminary remediation goal
- Q - qualifier
- TBC - to be considered

Rationale Codes:

Selection Reason:
- ASL - above screening levels
- HIST - infrequent detection but associated historically

Deletion Reason:
- BKG - below or consistent with background levels
- BSL - below screening level
- IFD - infrequent detection
- NTX - no toxicity information
- NUT - essential nutrient

[a] Screening toxicity values for soil/sediment are the PRGs taken from U.S. EPA Region IX (2003a). PRGs correspond to 1×10^{-6} or a hazard quotient of 0.1, whichever is lower.

[b] This default non-carcinogenic screening value for chromium is that for chromium(VI).

[c] This default screening value is that for naphthalene, the noncarcinogenic PAH with the most stringent risk-based concentration/PRG.

[d] Based on the risk-based concentration for pyrene. There is no EPA-derived toxicity value for phenanthrene. NJDEP and EPA indicated that the toxicity value for pyrene should be applied (NJDEP 2001).

Table 2.6

Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Subsurface soil
Exposure Point:	Undeveloped area subsurface soil (1-20 ft depths)

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
	INORGANIC ANALYTES																
7429-90-5	Aluminum	69.2		108000		mg/kg	TP-19	48/48	-	108000	N/A	7600	N			Yes	ASL
7440-36-0	Antimony	0.327		97.3		mg/kg	TP-13	37/48	0.45-3.63	97.3	0.05	3.1	N			Yes	ASL
7440-38-2	Arsenic	1.4		120		mg/kg	TP-15	43/51	0.46-5.8	120	10.7	0.39	C			Yes	ASL
7440-39-3	Barium	2.8		11200		mg/kg	TP-15	50/50	-	11200	N/A	540	N			Yes	ASL
7440-41-7	Beryllium	1.1		7.4		mg/kg	TP-05	4/48	0.0396-1.21	7.4	1.16	15	N			No	BSL
7440-43-9	Cadmium	0.29		36.1		mg/kg	TP-15	47/50	0.17-0.587	36.1	0.32	3.7	N			Yes	ASL
7440-70-2	Calcium	233		254000		mg/kg	TP-14	48/48	-	254000	N/A	N/A	N			No	NTX
7440-47-3	Chromium	2.64		9840		mg/kg	TP-13	50/51	2-2	9840	18.7	22	N[b]			Yes	ASL
7440-48-4	Cobalt	0.42		42.5		mg/kg	TP-15	45/48	0.23-0.466	42.5	N/A	140	N			No	BSL
7440-50-8	Copper	3.31		8720	J	mg/kg	TP-19	50/51	0.4-0.4	8720	28.4	290	N			Yes	ASL
7439-89-6	Iron	1370	J	323000		mg/kg	HS-04	50/50	-	323000	N/A	2300	N			Yes	ASL
7439-92-1	Lead	2.77		58200		mg/kg	TP-13	49/50	29-29	58200	100	400	N			Yes	ASL[c]
7439-95-4	Magnesium	32.9		9430		mg/kg	TP-16	48/48	-	9430	N/A	N/A				No	NTX
7439-96-5	Manganese	9.3	J	23300	J	mg/kg	TP-03	50/50	-	23300	846	180	N			Yes	ASL
7439-97-6	Mercury	0.15		34700		mg/kg	TP-17	103/104	0.15-0.15	34700	0.14	2.3	N			Yes	ASL
22967-92-6	Methyl mercury	0.1		7.44		ng/g	TP-13	7/7	-	7.44	N/A	610	N			Yes	HIST[d]
7440-02-0	Nickel	1.39		317		mg/kg	TP-15	50/51	0.26-0.26	317	14.9	160	N			Yes	ASL
7440-09-7	Potassium	39.4		4120		mg/kg	TP-15	48/48	-	4120	N/A	N/A				No	NTX
7782-49-2	Selenium	0.658		42.8		mg/kg	HS-04	17/50	0.3-8.8	42.8	0.17	39	N			Yes	ASL
7440-22-4	Silver	0.0949		1580		mg/kg	TP-05	42/51	0.1-0.36	1580	0.26	39	N			Yes	ASL
7440-23-5	Sodium	63		18900		mg/kg	TP-05	27/48	45.7-645	18900	N/A	N/A				No	NTX
7440-28-0	Thallium	9.4		12.9		mg/kg	TP-05	4/51	0.373-8.8	12.9	0.19	0.52	N			Yes	ASL
7440-62-2	Vanadium	3		980		mg/kg	TP-12	47/49	0.458-1.2	980	34.4	55	N			Yes	ASL
7440-66-6	Zinc	8.28		43200		mg/kg	TP-17	53/53	-	43200	82.6	2300	N			Yes	ASL
	ORGANIC ANALYTES																
120-82-1	1,2,4-Trichlorobenzene					µg/kg		0/38	370-1000	ND		65000	N			No	IFD
95-50-1	1,2-Dichlorobenzene					µg/kg		0/38	370-1000	ND		110000	N			No	IFD
541-73-1	1,3-Dichlorobenzene	82		130		µg/kg	TP-17	2/38	370-1000	130		1600	N			No	BSL
106-46-7	1,4-Dichlorobenzene	130		200		µg/kg	TP-10	2/38	370-1000	200		3400	C			No	BSL
108-60-1	2,2'-Oxybis[1-chloropropane]					µg/kg		0/38	370-1000	ND		2900	C			No	IFD
95-95-4	2,4,5-Trichlorophenol					µg/kg		0/38	930-2500	ND		610000	N			No	IFD
88-06-2	2,4,6-Trichlorophenol	66	J	66	J	µg/kg	TP-13	1/38	370-1000	66		610	N			No	BSL
120-83-2	2,4-Dichlorophenol					µg/kg		0/38	370-1000	ND		18000	N			No	IFD
105-67-9	2,4-Dimethylphenol	200		200		µg/kg	TP-18	1/38	370-1000	200		120000	N			No	BSL
51-28-5	2,4-Dinitrophenol	15	J	15	J	µg/kg	TP-18	1/38	930-2500	15		12000	N			No	BSL
121-14-2	2,4-Dinitrotoluene					µg/kg		0/38	370-1000	ND		12000	N			No	IFD
606-20-2	2,6-Dinitrotoluene					µg/kg		0/38	370-1000	ND		6100	N			No	IFD
91-58-7	2-Chloronaphthalene	230		230		µg/kg	TP-10	1/38	370-1000	230		490000	N			No	BSL
95-57-8	2-Chlorophenol					µg/kg		0/38	370-1000	ND		6300	N			No	IFD
534-52-1	2-Methyl-4,6-dinitrophenol					µg/kg		0/38	510-2500	ND		N/A				No	IFD
95-48-7	2-Methylphenol	140		140		µg/kg	TP-18	1/38	370-1000	140		310000	N			No	BSL
88-74-4	2-Nitroaniline					µg/kg		0/38	930-2500	ND		170	N			No	IFD
88-75-5	2-Nitrophenol					µg/kg		0/38	370-1000	ND		N/A				No	IFD
91-94-1	3,3'-Dichlorobenzidine	100		100		µg/kg	TP-18	1/38	370-1000	100		1100	C			No	BSL

Table 2.6
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
99-09-2	3-Nitroaniline					µg/kg		0/38	930–2500	ND		N/A				No	IFD
101-55-3	4-Bromophenyl-phenyl ether					µg/kg		0/38	370–1000	ND		N/A				No	IFD
59-50-7	4-Chloro-3-methylphenol					µg/kg		0/38	370–1000	ND		N/A				No	IFD
106-47-8	4-Chloroaniline					µg/kg		0/38	370–1000	ND		24000	N			No	IFD
7005-72-3	4-Chlorophenyl-phenyl ether					µg/kg		0/38	370–1000	ND		N/A				No	IFD
106-44-5	4-Methylphenol	78		410		µg/kg	TP-18	2/38	370–1000	410		31000	N			No	BSL
100-01-6	4-Nitroaniline					µg/kg		0/38	930–2500	ND		N/A				No	IFD
100-02-7	4-Nitrophenol					µg/kg		0/38	930–2500	ND		N/A				No	IFD
65-85-0	Benzoic acid	0.013		0.11		mg/kg	MW-7	4/4	-	0.11		24000	N			No	BSL
111-91-1	bis[2-chloroethoxy]methane					µg/kg		0/38	370–1000	ND		N/A				No	IFD
111-44-4	bis[2-chloroethyl]ether					µg/kg		0/38	370–1000	ND		210	C			No	IFD
117-81-7	bis[2-Ethylhexyl]phthalate	0.095		22		mg/kg	TP-13	42/48	0.37–1	22		35	C			No	BSL
85-68-7	Butylbenzyl phthalate	0.013		1.4		mg/kg	MW-4	12/41	0.071–1	1.4		1200	N			No	BSL
86-74-8	Carbazole	43		25000		µg/kg	TP-18	12/38	370–1000	25000		24000	C			Yes	ASL
132-64-9	Dibenzofuran	0.003		16		mg/kg	TP-18	8/40	0.37–1	16		29	N			No	BSL
84-66-2	Diethyl phthalate	0.045		0.66		mg/kg	TP-20	12/41	0.37–1	0.66		4900	N			No	BSL
131-11-3	Dimethyl phthalate	240		670		µg/kg	TP-08	2/38	370–1000	670		61000000	N			No	BSL
84-74-2	Di-n-butyl phthalate	0.05		37	J	mg/kg	TP-08	28/47	0.37–3.8	37		610	N			No	BSL
117-84-0	Di-n-octyl phthalate	0.01		2.5		mg/kg	TP-13	4/40	0.37–1	2.5		240	N			No	BSL
118-74-1	Hexachlorobenzene	94		94		µg/kg	TP-09	1/38	370–1000	94		300	C			No	BSL
87-68-3	Hexachlorobutadiene					µg/kg		0/38	370–1000	ND		1800	N			No	IFD
77-47-4	Hexachlorocyclopentadiene					µg/kg		0/38	370–1000	ND		37000	N			No	IFD
67-72-1	Hexachloroethane					µg/kg		0/38	370–1000	ND		6100	N			No	IFD
78-59-1	Isophorone					µg/kg		0/38	370–1000	ND		510000	C			No	IFD
98-95-3	Nitrobenzene					µg/kg		0/38	370–1000	ND		2000	N			No	IFD
621-64-7	N-nitroso-di-n-propylamine					µg/kg		0/38	370–1000	ND		69	C			No	IFD
86-30-6	N-nitrosodiphenylamine	50		230		µg/kg	TP-05	5/38	370–1000	230		99000	C			No	BSL
87-86-5	Pentachlorophenol	67		140	J	µg/kg	TP-09	2/38	930–2500	140		3000	C			No	BSL
108-95-2	Phenol	78		310		µg/kg	TP-18	2/38	370–1000	310		3700000	N			No	BSL
71-55-6	1,1,1-Trichloroethane					µg/kg		0/38	11–30	ND		200000	N			No	IFD
79-34-5	1,1,2,2-Tetrachloroethane					µg/kg		0/38	11–30	ND		410	C			No	IFD
79-00-5	1,1,2-Trichloroethane					µg/kg		0/38	11–30	ND		730	C			No	IFD
75-34-3	1,1-Dichloroethane					µg/kg		0/38	11–30	ND		51000	N			No	IFD
75-35-4	1,1-Dichloroethene					µg/kg		0/38	11–30	ND		12400	N			No	IFD
107-06-2	1,2-Dichloroethane					µg/kg		0/38	11–30	ND		280	C			No	IFD
540-59-0	1,2-Dichloroethene Isomers (total)					µg/kg		0/38	11–30	ND		4300	N[e]			No	IFD
78-87-5	1,2-Dichloropropane					µg/kg		0/38	11–30	ND		340	C			No	IFD
78-93-3	2-Butanone	0.085	J	0.28		mg/kg	MW-6	2/39	0.011–0.021	0.28		730	N			No	BSL
591-78-6	2-Hexanone					µg/kg		0/38	11–30	ND		N/A				No	IFD
108-10-1	4-Methyl-2-pentanone					µg/kg		0/38	11–30	ND		79000	N			No	IFD
67-64-1	Acetone	8	J	220	J	µg/kg	TP-02	4/38	11–21	220		160000	N			No	BSL
71-43-2	Benzene	0.0036	J	0.01		mg/kg	TP-13	5/41	0.011–0.03	0.01		0.65	C			No	BSL
75-27-4	Bromodichloromethane					µg/kg		0/38	11–30	ND		820	C			No	IFD
75-25-2	Bromoform					µg/kg		0/38	11–30	ND		62000	C			No	IFD
74-83-9	Bromomethane					µg/kg		0/38	11–30	ND		390	N			No	IFD
75-15-0	Carbon disulfide	8		8		µg/kg	TP-02	1/38	11–21	8		36000	N			No	BSL
56-23-5	Carbon tetrachloride					µg/kg		0/38	11–30	ND		210	N			No	IFD
108-90-7	Chlorobenzene	10		10		µg/kg	TP-10	1/40	6.3–30	10		15000	N			No	BSL
75-00-3	Chloroethane					µg/kg		0/38	11–30	ND		3000	C			No	IFD
67-66-3	Chloroform					µg/kg		0/38	11–30	ND		360	N			No	IFD
74-87-3	Chloromethane					µg/kg		0/38	11–30	ND		1200	C			No	IFD

Table 2.6
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
10061-01-5	cis-1,3-Dichloropropene					µg/kg		0/38	11–30	ND		780	C			No	IFD
124-48-1	Dibromochloromethane					µg/kg		0/38	11–30	ND		1100	C			No	IFD
100-41-4	Ethylbenzene	0.002		0.31		mg/kg	TP-13	5/40	0.011–0.03	0.31		8.9	C			No	BSL
136777-61-2	meta & para Xylenes	1.3	J	1.3	J	µg/kg	MW-14	1/2	8.6–8.6	1.3		N/A				No	NTX
75-09-2	Methylene chloride	3	J	7.5	J	µg/kg	TP-08	5/38	11–30	7.5		9100	C			No	BSL
95-47-6	ortho-Xylene					µg/kg		0/2	6.3–8.6	ND		N/A				No	IFD
100-42-5	Styrene					µg/kg		0/38	11–30	ND		440000	N			No	IFD
127-18-4	Tetrachloroethene					µg/kg		0/38	11–30	ND		1500	C			No	IFD
108-88-3	Toluene	0.0022	J	70		mg/kg	TP-13	8/43	0.011–0.03	70		66	N			Yes	ASL
10061-02-6	trans-1,3-Dichloropropene					µg/kg		0/38	11–30	ND		780	C			No	IFD
79-01-6	Trichloroethene					µg/kg		0/38	11–30	ND		53	C			No	IFD
75-01-4	Vinyl chloride					µg/kg		0/38	11–30	ND		79	C			No	IFD
1330-20-7	Xylene isomers (total)	0.017		110		mg/kg	TP-13	5/40	0.011–0.03	110		28	N			Yes	ASL
	PAHs																
91-57-6	2-Methylnaphthalene	0.007		8.8		mg/kg	TP-18	12/44	0.37–1	8.8		5.6	N[f]			Yes	ASL
83-32-9	Acenaphthene	0.045		36		mg/kg	TP-18	9/39	0.37–1	36		370	N			No	BSL
208-96-8	Acenaphthylene	0.032		0.241		mg/kg	TP-20	13/40	0.37–1	0.241		5.6	N[f]			No	BSL
120-12-7	Anthracene	0.009		44		mg/kg	TP-18	28/42	0.37–1	44		2200	N			No	BSL
56-55-3	Benz[a]anthracene	55		62000		µg/kg	TP-18	29/38	380–1000	62000		620	C			Yes	ASL
50-32-8	Benzo[a]pyrene	0.072		52		mg/kg	TP-18	29/40	0.38–1	52		0.062	C			Yes	ASL
205-99-2	Benzo[b]fluoranthene	0.074		64		mg/kg	TP-18	31/40	0.38–1	64		0.62	C			Yes	ASL
191-24-2	Benzo[ghi]perylene	50		19000		µg/kg	TP-18	28/38	380–1000	19000		5600	N[f]			Yes	ASL
207-08-9	Benzo[k]fluoranthene	44		16000		µg/kg	TP-18	25/38	380–1000	16000		6200	C			Yes	ASL
218-01-9	Chrysene	0.027		61		mg/kg	TP-18	34/42	0.38–1	61		62	C			No	BSL
53-70-3	Dibenz[a,h]anthracene	53		1300		µg/kg	TP-18	20/38	370–1000	1300		62	C			Yes	ASL
206-44-0	Fluoranthene	0.026		130	J	mg/kg	TP-18	36/43	0.38–1	130		230	N			No	BSL
86-73-7	Fluorene	0.055		25		mg/kg	TP-18	11/39	0.37–1	25		270	N			No	BSL
193-39-5	Indeno[1,2,3-cd]pyrene	45		20000		µg/kg	TP-18	26/38	380–1000	20000		620	C			Yes	ASL
91-20-3	Naphthalene	0.009		22		mg/kg	TP-18	14/42	0.37–1	22		5.6	N			Yes	ASL
85-01-8	Phenanthrene	0.015		140	J	mg/kg	TP-18	34/44	0.38–1	140		230	N[g]			No	BSL
129-00-0	Pyrene	0.006		86	J	mg/kg	TP-18	37/44	0.056–1	86		230	N			No	BSL
	PCBs																
53469-21-9	Aroclor® 1242	0.79		0.79		mg/kg	MW-7	1/1	–	0.79		0.22	C			Yes	ASL
12672-29-6	Aroclor® 1248	4.4		4.4		mg/kg	MW-7	1/1	–	4.4		0.22	C			Yes	ASL
11097-69-1	Aroclor® 1254	0.55		0.55		mg/kg	MW-5	1/1	–	0.55		0.11	N			Yes	ASL
11096-82-5	Aroclor® 1260	0.083		0.083		mg/kg	MW-2	1/1	–	0.083		0.22	C			No	BSL
	PESTICIDES																
50-29-3	4,4'-DDT	0.034		0.034		mg/kg	MW-6	1/1	–	0.034		1.7	C			No	BSL
5103-71-9	alpha-Chlordane	0.067		0.067		mg/kg	MW-6	1/1	–	0.067		1.6	C			No	BSL
5103-74-2	gamma-Chlordane	0.061		0.09		mg/kg	MW-5	2/2	–	0.09		1.6	C			No	BSL

Table 2.6
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]	Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection

Note: All results reported as dry weight.
For the purposes of screening, field replicates have been averaged.

-- - either no detected or undetected values
ARAR - applicable or relevant and appropriate requirement
C - carcinogenic based on a cancer risk of 1×10^{-6}
CoPC - chemical of potential concern
J - estimated value
N - noncarcinogenic based on hazard quotient of 0.1
N/A - not applicable
ND - not detected
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
PRG - preliminary remediation goal
Q - qualifier
TBC - to be considered

Rationale Codes:

Selection Reason:
ASL - above screening levels
HIST - infrequent detection but associated historically

Deletion Reason:
BKG - below or consistent with background levels
BSL - below screening level
IFD - infrequent detection
NTX - no toxicity information
NUT - essential nutrient

[a] Screening toxicity values for soil/sediment are the PRGs taken from U.S. EPA Region IX (2003a). PRGs correspond to 1×10^{-6} or a hazard quotient of 0.1, whichever is lower.
[b] This default non-carcinogenic screening value for chromium is that for chromium(VI).
[c] Consistent with EPA model in puts for for lead, screening was based on the mean concentration of 2,096 mg/kg rather than a maximum value.
[d] Methylmercury is included as a CoPC at the request of the New Jersey Department of Environmental Protection and U.S. EPA Region II reviewers.
[e] This default non-carcinogenic screening value is that for *cis*-1,2-dichloroethene.
[f] This default screening value is that for naphthalene, the noncarcinogenic PAH with the most stringent risk-based concentration/PRG.
[g] Based on the risk-based concentration for pyrene. There is no EPA-derived toxicity value for phenanthrene. NJDEP and EPA indicated that the toxicity value for pyrene should be applied (NJDEP 2001).

Table 2.7
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

Scenario Timeframe:	Current/Future
Medium:	Surface water
Exposure Medium:	Surface water
Exposure Point:	Undeveloped Area surface water

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]	Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
	INORGANIC ANALYTES															
7429-90-5	Aluminum	–		–		µg/L		0/2	94.8–191	ND	N/A	3600 N			No	IFD
7440-36-0	Antimony	–		–		µg/L		0/2	3.4–3.4	ND	N/A	1.5 N	6.0	MCL	No	IFD
7440-38-2	Arsenic	–		–		µg/L		0/5	2.4–5.5	ND	N/A	0.045 C	50	MCL	No	IFD
7440-39-3	Barium	40		189		µg/L	SW-09	5/5	–	189	N/A	260 N	2000	MCL	No	BSL
7440-41-7	Beryllium	–		–		µg/L		0/2	0.19–0.19	ND	N/A	7.3 N	4.0	MCL	No	IFD
7440-43-9	Cadmium	1.2		1.2		µg/L	SW-11	1/5	0.21–0.62	1.2	N/A	1.8 N	5.0	MCL	No	BSL
7440-70-2	Calcium	54000		55600		µg/L	SW-09	2/2	–	55600	N/A	N/A			No	NUT
7440-47-3	Chromium	1.7		6.2		µg/L	SW-11	3/5	1.2–1.2	6.2	N/A	11 N[b]	100	MCL	No	BSL
7440-48-4	Cobalt	–		–		µg/L		0/2	1–1.4	ND	N/A	73 N			No	IFD
7440-50-8	Copper	2.4		3.2		µg/L	SW-08	2/5	5.9–13	3.2	N/A	150 N	1300	TT	No	BSL
7439-89-6	Iron	653		2620		µg/L	SW-11	5/5	–	2620	N/A	1100 N			**Yes**	ASL
7439-92-1	Lead	2		19		µg/L	SW-11	5/5	–	19	N/A	15 MCL	15	TT	No	ASL[c]
7439-95-4	Magnesium	66200		67500		µg/L	SW-09	2/2	–	67500	N/A	N/A			No	NUT
7439-96-5	Manganese	141		413		µg/L	SW-10	5/5	–	413	N/A	88 N			**Yes**	ASL
7439-97-6	Mercury (total)	402		17600		ng/L	SW-08	5/5	–	17600	N/A	1100 N	2.0	MCL	**Yes**	ASL
22967-92-6	Methyl mercury	1.14		2.77		ng/L	SW-12	5/5	–	2.77	N/A	360 N			**Yes**	HIST[d]
7440-02-0	Nickel	1.7		3.6		µg/L	SW-10	3/5	4–4.4	3.6	N/A	73 N			No	BSL
7440-09-7	Potassium	27600	J	28000	J	µg/L	SW-09	2/2	–	28000	N/A	N/A			No	NUT
7782-49-2	Selenium	–		–		µg/L		0/5	2.4–3.8	ND	N/A	18 N	50	MCL	No	IFD
7440-22-4	Silver	–		–		µg/L		0/5	0.67–1.8	ND	N/A	18 N			No	IFD
7440-23-5	Sodium	396000	J	438000	J	µg/L	SW-09	2/2	–	438000	N/A	N/A			No	NUT
7440-28-0	Thallium	–		–		µg/L		0/5	4.4–6.4	ND	N/A	0.24 N	2.0	MCL	No	IFD
7440-62-2	Vanadium	2.6		3		µg/L	SW-08	2/2	–	3	N/A	26 N			No	BSL
7440-66-6	Zinc	35.9	J	403		µg/L	SW-11	4/5	54.1–54.1	403	N/A	1100 N			No	BSL
	ORGANIC ANALYTES															
	Petroleum hydrocarbons	–		–		mg/L		0/2	0.5–0.5	ND		N/A			No	IFD
120-82-1	1,2,4-Trichlorobenzene	–		–		µg/L		0/2	10–10	ND		19 N	70	MCL	No	IFD
95-50-1	1,2-Dichlorobenzene	–		–		µg/L		0/2	10–10	ND		37 N	600	MCL	No	IFD
541-73-1	1,3-Dichlorobenzene	–		–		µg/L		0/2	10–10	ND		0.55 N			No	IFD
106-46-7	1,4-Dichlorobenzene	–		–		µg/L		0/2	10–10	ND		0.5 C	75	MCL	No	IFD
108-60-1	2,2'-Oxybis[1-chloropropane]	–		–		µg/L		0/2	10–10	ND		0.27 C			No	IFD
95-95-4	2,4,5-Trichlorophenol	–		–		µg/L		0/2	25–25	ND		360 N			No	IFD
88-06-2	2,4,6-Trichlorophenol	–		–		µg/L		0/2	10–10	ND		0.36 C			No	IFD
120-83-2	2,4-Dichlorophenol	–		–		µg/L		0/2	10–10	ND		11 N			No	IFD
105-67-9	2,4-Dimethylphenol	–		–		µg/L		0/2	10–10	ND		73 N			No	IFD
51-28-5	2,4-Dinitrophenol	–		–		µg/L		0/2	10–25	ND		7.3 N			No	IFD
121-14-2	2,4-Dinitrotoluene	–		–		µg/L		0/2	10–10	ND		7.3 N			No	IFD
606-20-2	2,6-Dinitrotoluene	–		–		µg/L		0/2	10–10	ND		3.6 N			No	IFD
91-58-7	2-Chloronaphthalene	–		–		µg/L		0/2	10–10	ND		49 N			No	IFD
95-57-8	2-Chlorophenol	–		–		µg/L		0/2	10–10	ND		3 N			No	IFD
534-52-1	2-Methyl-4,6-dinitrophenol	–		–		µg/L		0/2	25–25	ND		N/A			No	IFD
95-48-7	2-Methylphenol	–		–		µg/L		0/2	10–10	ND		180 N			No	IFD
88-74-4	2-Nitroaniline	–		–		µg/L		0/2	25–25	ND		0.1 N			No	IFD
88-75-5	2-Nitrophenol	–		–		µg/L		0/2	10–10	ND		N/A			No	IFD
91-94-1	3,3'-Dichlorobenzidine	–		–		µg/L		0/2	10–10	ND		0.15 C			No	IFD
99-09-2	3-Nitroaniline	–		–		µg/L		0/2	25–25	ND		N/A			No	IFD
101-55-3	4-Bromophenyl-phenyl ether	–		–		µg/L		0/2	10–10	ND		N/A			No	IFD
59-50-7	4-Chloro-3-methylphenol	–		–		µg/L		0/2	10–10	ND		N/A			No	IFD

Table 2.7
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]	Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
106-47-8	4-Chloroaniline	–		–		µg/L		0/2	10–10	ND		15 N			No	IFD
7005-72-3	4-Chlorophenyl-phenyl ether	–		–		µg/L		0/2	10–10	ND		N/A			No	IFD
106-44-5	4-Methylphenol	–		–		µg/L		0/2	10–10	ND		18 N			No	IFD
100-01-6	4-Nitroaniline	–		–		µg/L		0/2	25–25	ND		N/A			No	IFD
100-02-7	4-Nitrophenol	–		–		µg/L		0/2	25–25	ND		29 N			No	IFD
111-91-1	bis[2-chloroethoxy]methane	–		–		µg/L		0/2	10–10	ND		N/A			No	IFD
111-44-4	bis[2-chloroethyl]ether	–		–		µg/L		0/2	10–10	ND		0.0098 C			No	IFD
117-81-7	bis[2-Ethylhexyl]phthalate	–		–		µg/L		0/2	10–10	ND		4.8 C	6.0	MCL	No	IFD
85-68-7	Butylbenzyl phthalate	–		–		µg/L		0/2	10–10	ND		730 N			No	IFD
86-74-8	Carbazole	–		–		µg/L		0/2	10–10	ND		3.4 C			No	IFD
132-64-9	Dibenzofuran	–		–		µg/L		0/2	10–10	ND		2.4 N			No	IFD
84-66-2	Diethyl phthalate	–		–		µg/L		0/2	10–10	ND		2900 N			No	IFD
131-11-3	Dimethyl phthalate	–		–		µg/L		0/2	10–10	ND		36000 N			No	IFD
84-74-2	Di-n-butyl phthalate	–		–		µg/L		0/2	10–10	ND		360 N			No	IFD
117-84-0	Di-n-octyl phthalate	–		–		µg/L		0/2	10–10	ND		150 N			No	IFD
118-74-1	Hexachlorobenzene	–		–		µg/L		0/2	10–10	ND		0.042 C	1.0	MCL	No	IFD
87-68-3	Hexachlorobutadiene	–		–		µg/L		0/2	10–10	ND		0.86 C			No	IFD
77-47-4	Hexachlorocyclopentadiene	–		–		µg/L		0/2	10–10	ND		22 N	50	MCL	No	IFD
67-72-1	Hexachloroethane	–		–		µg/L		0/2	10–10	ND		3.6 N			No	IFD
78-59-1	Isophorone	–		–		µg/L		0/2	10–10	ND		71 C			No	IFD
98-95-3	Nitrobenzene	–		–		µg/L		0/2	10–10	ND		0.34 N			No	IFD
621-64-7	N-nitroso-di-n-propylamine	–		–		µg/L		0/2	10–10	ND		0.0096 C			No	IFD
86-30-6	N-nitrosodiphenylamine	–		–		µg/L		0/2	10–10	ND		14 C			No	IFD
87-86-5	Pentachlorophenol	–		–		µg/L		0/2	25–25	ND		0.56 C	1.0	MCL	No	IFD
108-95-2	Phenol	–		–		µg/L		0/2	10–10	ND		2200 N			No	IFD
71-55-6	1,1,1-Trichloroethane	–		–		µg/L		0/2	10–10	ND		320 N	200	MCL	No	IFD
79-34-5	1,1,2,2-Tetrachloroethane	–		–		µg/L		0/2	10–10	ND		0.055 C			No	IFD
79-00-5	1,1,2-Trichloroethane	–		–		µg/L		0/2	10–10	ND		0.2 C	5.0	MCL	No	IFD
75-34-3	1,1-Dichloroethane	–		–		µg/L		0/2	10–10	ND		81 N			No	IFD
75-35-4	1,1-Dichloroethene	–		–		µg/L		0/2	10–10	ND		34 C	7.0	MCL	No	IFD
107-06-2	1,2-Dichloroethane	–		–		µg/L		0/2	10–10	ND		0.12 C	5.0	MCL	No	IFD
540-59-0	1,2-Dichloroethene isomers (total)	–		–		µg/L		0/2	10–10	ND		6.1 N[e]	70	MCL	No	IFD
78-87-5	1,2-Dichloropropane	–		–		µg/L		0/2	10–10	ND		0.16 C	5.0	MCL	No	IFD
78-93-3	2-Butanone	–		–		µg/L		0/2	10–10	ND		190 N			No	IFD
591-78-6	2-Hexanone	–		–		µg/L		0/2	10–10	ND		N/A			No	IFD
108-10-1	4-Methyl-2-pentanone	–		–		µg/L		0/2	10–10	ND		16 N			No	IFD
67-64-1	Acetone	–		–		µg/L		0/2	10–10	ND		61 N			No	IFD
71-43-2	Benzene	–		–		µg/L		0/2	10–10	ND		0.34 C	5.0	MCL	No	IFD
75-27-4	Bromodichloromethane	–		–		µg/L		0/2	10–10	ND		0.18 C			No	IFD
75-25-2	Bromoform	–		–		µg/L		0/2	10–10	ND		8.5 C			No	IFD
74-83-9	Bromomethane	–		–		µg/L		0/2	10–10	ND		0.87 N			No	IFD
75-15-0	Carbon disulfide	–		–		µg/L		0/2	10–10	ND		100 N			No	IFD
56-23-5	Carbon tetrachloride	–		–		µg/L		0/2	10–10	ND		0.17 C			No	IFD
108-90-7	Chlorobenzene	–		–		µg/L		0/2	10–10	ND		11 N	100	MCL	No	IFD
75-00-3	Chloroethane	–		–		µg/L		0/2	10–10	ND		4.6 C			No	IFD
67-66-3	Chloroform	–		–		µg/L		0/2	10–10	ND		0.62 N			No	IFD
74-87-3	Chloromethane	–		–		µg/L		0/2	10–10	ND		1.5 C			No	IFD
10061-01-5	cis-1,3-Dichloropropene	–		–		µg/L		0/2	10–10	ND		0.4 C			No	IFD
124-48-1	Dibromochloromethane	–		–		µg/L		0/2	10–10	ND		0.13 C			No	IFD
100-41-4	Ethylbenzene	–		–		µg/L		0/2	10–10	ND		2.9 C	700	MCL	No	IFD
75-09-2	Methylene chloride	–		–		µg/L		0/2	10–10	ND		4.3 C			No	IFD
100-42-5	Styrene	–		–		µg/L		0/2	10–10	ND		160 N			No	IFD
127-18-4	Tetrachloroethene	–		–		µg/L		0/2	10–10	ND		0.66 C	5.0	MCL	No	IFD
108-88-3	Toluene	–		–		µg/L		0/2	10–10	ND		72 N	1000	MCL	No	IFD
10061-02-6	trans-1,3-Dichloropropene	–		–		µg/L		0/2	10–10	ND		0.4 C			No	IFD

Table 2.7
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]	Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
79-01-6	Trichloroethene	--		--		µg/L		0/2	10–10	ND		0.028 C	5.0	MCL	No	IFD
75-01-4	Vinyl chloride	--		--		µg/L		0/2	10–10	ND		0.02 C	2.0	MCL	No	IFD
1330-20-7	Xylene isomers (total)	--		--		µg/L		0/2	10–10	ND		21 N	10000	MCL	No	IFD
	PAHs															
91-57-6	2-Methylnaphthalene	--		--		µg/L		0/2	10–10	ND		0.62 N[f]			No	IFD
83-32-9	Acenaphthene	--		--		µg/L		0/2	10–10	ND		37 N			No	IFD
208-96-8	Acenaphthylene	--		--		µg/L		0/2	10–10	ND		0.62 N[f]			No	IFD
120-12-7	Anthracene	--		--		µg/L		0/2	10–10	ND		180 N			No	IFD
56-55-3	Benz[a]anthracene	--		--		µg/L		0/2	10–10	ND		0.092 C	0.2	MCL	No	IFD
50-32-8	Benzo[a]pyrene	--		--		µg/L		0/2	10–10	ND		0.0092 C			No	IFD
205-99-2	Benzo[b]fluoranthene	--		--		µg/L		0/2	10–10	ND		0.092 C			No	IFD
191-24-2	Benzo[ghi]perylene	--		--		µg/L		0/2	10–10	ND		0.62 N[f]			No	IFD
207-08-9	Benzo[k]fluoranthene	--		--		µg/L		0/2	10–10	ND		0.92 C			No	IFD
218-01-9	Chrysene	--		--		µg/L		0/2	10–10	ND		9.2 C			No	IFD
53-70-3	Dibenz[a,h]anthracene	--		--		µg/L		0/2	10–10	ND		0.0092 C			No	IFD
206-44-0	Fluoranthene	--		--		µg/L		0/2	10–10	ND		150 N			No	IFD
86-73-7	Fluorene	--		--		µg/L		0/2	10–10	ND		24 N			No	IFD
193-39-5	Indeno[1,2,3-cd]pyrene	--		--		µg/L		0/2	10–10	ND		0.092 C			No	IFD
91-20-3	Naphthalene	--		--		µg/L		0/2	10–10	ND		0.62 N			No	IFD
85-01-8	Phenanthrene	--		--		µg/L		0/2	10–10	ND		18 N[g]			No	IFD
129-00-0	Pyrene	--		--		µg/L		0/2	10–10	ND		18 N			No	IFD

Note: All results reported as unfiltered.
For the purposes of screening, field replicates have been averaged.

-- - either no detected or undetected values
ARAR - applicable or relevant and appropriate requirement
C - carcinogenic based on a cancer risk of 1×10^{-6}
CoPC - chemical of potential concern
J - estimated value
MCL - maximum contaminant level
N - noncarcinogenic based on hazard quotient of 0.1
N/A - not applicable
ND - not detected
TT - Treatment technique action level
PAH - polycyclic aromatic hydrocarbon
PRG - preliminary remediation goal
Q - qualifier
TBC - to be considered

Rationale Codes:
Selection Reason:
ASL - above screening levels
HIST - infrequent detection but associated historically
Deletion Reason:
BKG - below or consistent with background levels
BSL - below screening level
IFD - infrequent detection
NTX - no toxicity information
NUT - essential nutrient

[a] Screening toxicity values for soil are the PRGs taken from U.S. EPA Region IX (2003a). PRGs correspond to 1×10^{-6} or a hazard quotient of 0.1, whichever is lower.

[b] This default non-carcinogenic screening value for chromium is that for chromium(VI).

[c] Consistent with EPA model in puts for for lead, screening was based on the mean concentration of 6.8 µg/L rather than a maximum value.

[d] Methylmercury is included as a CoPC at the request of the New Jersey Department of Environmental Protection and U.S. EPA Region II reviewers.

[e] This default non-carcinogenic screening value is that for *cis*-1,2-dichloroethene.

[f] This default screening value is that for naphthalene, the noncarcinogenic PAH with the most stringent risk-based concentration/PRG.

[g] Based on the risk-based concentration for pyrene. There is no EPA-derived toxicity value for phenanthrene. NJDEP and EPA indicated that the toxicity value for pyrene should be applied (NJDEP 2001).

Table 2.8

Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Groundwater
Exposure Point:	Groundwater sitewide

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]	Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
	INORGANIC ANALYTES															
7429-90-5	Aluminum	65.3		120		µg/L	MW-2	2/12	28.1–282	120	N/A	3600 N			No	BSL
7440-36-0	Antimony	–		–		µg/L		0/12	3.4–3.4	ND	N/A	1.5 N	6.0	MCL	No	IFD
7440-38-2	Arsenic	2.6		41.5		µg/L	MW-2	8/43	2.23–6.67	41.5	N/A	0.045 C	50	MCL	**Yes**	ASL
7440-39-3	Barium	22.7		1100		µg/L	MW-2	42/43	20–20	1100	N/A	260 N	2000	MCL	**Yes**	ASL
7440-41-7	Beryllium	0.52		0.61		µg/L	MW-2	2/12	0.25–0.85	0.61	N/A	7.3 N	4.0	MCL	No	BSL
7440-43-9	Cadmium	0.831		5.7		µg/L	MW-2	15/43	0.21–0.62	5.7	N/A	1.8 N	5.0	MCL	**Yes**	ASL
7440-70-2	Calcium	49900		568000		µg/L	MW-2	12/12	–	568000	N/A	N/A			No	NTX
7440-47-3	Chromium	0.27		9.7		µg/L	MW-2	15/27	0.22–1.4	9.7	N/A	11 N[b]	100	MCL	No	BSL
7440-48-4	Cobalt	0.94		3.9		µg/L	MW-2	10/12	0.88–0.88	3.9	N/A	73 N			No	BSL
7440-50-8	Copper	1.7		356		µg/L	MW-2	10/43	1.5–20	356	N/A	150 N	1300	TT	**Yes**	ASL
7439-89-6	Iron	100		37500		µg/L	MW-2	40/43	71.8–100	37500	N/A	1100 N			**Yes**	ASL
7439-92-1	Lead	1		13.9		µg/L	MW-2	9/43	0.99–5.2	13.9	N/A	15 MCL	15	TT	No	BSL
7439-95-4	Magnesium	8130		87500		µg/L	MW-2	12/12	–	87500	N/A	N/A			No	NTX
7439-96-5	Manganese	7.2		6580		µg/L	MW-2	42/43	10–10	6580	N/A	88 N			**Yes**	ASL
7439-97-6	Mercury (total)	0.01084		54.243		µg/L	MW-2	39/46	0.2–0.2	54.243	N/A	1.1 N	2.0	MCL	**Yes**	ASL
22967-92-6	Methyl mercury	0.12		32.73		ng/L	MW-3	27/27	–	32.73	N/A	360 N			**Yes**	HIST[c]
7440-02-0	Nickel	2		115	J	µg/L	MW-2	20/43	1.1–40	115	N/A	73 N			**Yes**	ASL
7440-09-7	Potassium	1140	J	32800	J	µg/L	MW-2	12/12	–	32800	N/A	N/A			No	NTX
7782-49-2	Selenium	2.94	J	13.4		µg/L	MW-2	6/27	2.4–3.8	13.4	N/A	18 N	50	MCL	No	BSL
7440-22-4	Silver	–		–		µg/L		0/27	0.67–1.84	ND	N/A	18 N			No	IFD
7440-23-5	Sodium	31700		484000	J	µg/L	MW-2	12/12	–	484000	N/A	N/A			No	NTX
7440-28-0	Thallium	0.297		13.5		µg/L	MW-2	5/43	0.2–10.3	13.5	N/A	0.24 N	2.0	MCL	**Yes**	ASL
7440-62-2	Vanadium	2.3		62.9		µg/L	MW-2	11/28	1.6–50	62.9	N/A	26 N			**Yes**	ASL
7440-66-6	Zinc	12.5		803		µg/L	MW-2	19/27	9.6–17.8	803	N/A	1100 N			No	BSL
	ORGANIC ANALYTES															
	Petroleum hydrocarbons	0.5		3.6		mg/L	MW-2	2/27	0.5–0.5	3.6		N/A			No	NTX
120-82-1	1,2,4-Trichlorobenzene	–		–		µg/L		0/13	10–400	ND		19 N	70	MCL	No	IFD
95-50-1	1,2-Dichlorobenzene	1		1		µg/L	MW-2	1/13	10–400	1		37 N	600	MCL	No	BSL
541-73-1	1,3-Dichlorobenzene	–		–		µg/L		0/13	10–400	ND		0.55 N			No	IFD
106-46-7	1,4-Dichlorobenzene	3		4		µg/L	MW-1	2/13	10–400	4		0.5 C	75	MCL	**Yes**	ASL
108-60-1	2,2'-Oxybis[1-chloropropa	–		–		µg/L		0/13	10–400	ND		0.27 C			No	IFD
95-95-4	2,4,5-Trichlorophenol	–		–		µg/L		0/13	10–1000	ND		360 N			No	IFD
88-06-2	2,4,6-Trichlorophenol	–		–		µg/L		0/13	10–400	ND		0.36 N			No	IFD
120-83-2	2,4-Dichlorophenol	–		–		µg/L		0/13	10–400	ND		11 N			No	IFD
105-67-9	2,4-Dimethylphenol	–		–		µg/L		0/13	10–400	ND		73 N			No	IFD
51-28-5	2,4-Dinitrophenol	–		–		µg/L		0/13	25–1000	ND		7.3 N			No	IFD
121-14-2	2,4-Dinitrotoluene	–		–		µg/L		0/13	10–400	ND		7.3 N			No	IFD
606-20-2	2,6-Dinitrotoluene	–		–		µg/L		0/13	10–400	ND		3.6 N			No	IFD
91-58-7	2-Chloronaphthalene	–		–		µg/L		0/13	10–400	ND		49 N			No	IFD
95-57-8	2-Chlorophenol	–		–		µg/L		0/13	10–400	ND		3 N			No	IFD
534-52-1	2-Methyl-4,6-dinitrophenol	–		–		µg/L		0/13	25–1000	ND		N/A			No	IFD

Table 2.8
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]	Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
95-48-7	2-Methylphenol	–		–		µg/L		0/13	10–400	ND		180 N			No	IFD
88-74-4	2-Nitroaniline	–		–		µg/L		0/13	25–1000	ND		0.1 N			No	IFD
88-75-5	2-Nitrophenol	–		–		µg/L		0/13	10–400	ND		N/A N			No	IFD
91-94-1	3,3'-Dichlorobenzidine	–		–		µg/L		0/13	10–400	ND		0.15 C			No	IFD
99-09-2	3-Nitroaniline	–		–		µg/L		0/13	25–1000	ND		N/A			No	IFD
101-55-3	4-Bromophenyl-phenyl eth	–		–		µg/L		0/13	10–400	ND		N/A			No	IFD
59-50-7	4-Chloro-3-methylphenol	–		–		µg/L		0/13	10–400	ND		N/A			No	IFD
106-47-8	4-Chloroaniline	–		–		µg/L		0/13	10–400	ND		15 N			No	IFD
7005-72-3	4-Chlorophenyl-phenyl eth	–		–		µg/L		0/13	10–400	ND		N/A			No	IFD
106-44-5	4-Methylphenol	2		62		µg/L	MW-1	2/13	10–10	62		18 N			**Yes**	ASL
100-01-6	4-Nitroaniline	–		–		µg/L		0/13	25–1000	ND		N/A N			No	IFD
100-02-7	4-Nitrophenol	–		–		µg/L		0/13	25–1000	ND		29			No	IFD
100-51-6	Benzyl alcohol	–		–		µg/L		0/1	10–10	ND		1100 N			No	IFD
111-91-1	bis[2-chloroethoxy]methar	–		–		µg/L		0/13	10–400	ND		N/A			No	IFD
111-44-4	bis[2-chloroethyl]ether	–		–		µg/L		0/13	10–400	ND		0.0098 C			No	IFD
117-81-7	bis[2-Ethylhexyl]phthalate	2		2		µg/L	MW-1	1/13	10–400	2		4.8 C	6.0	MCL	No	BSL
85-68-7	Butylbenzyl phthalate	–		–		µg/L		0/13	10–400	ND		730 N			No	IFD
86-74-8	Carbazole	–		–		µg/L		0/13	10–400	ND		3.4 C			No	IFD
132-64-9	Dibenzofuran	–		–		µg/L		0/13	10–400	ND		2.4 N			No	IFD
84-66-2	Diethyl phthalate	–		–		µg/L		0/13	10–400	ND		2900 N			No	IFD
131-11-3	Dimethyl phthalate	–		–		µg/L		0/13	10–400	ND		36000 N			No	IFD
84-74-2	Di-n-butyl phthalate	–		–		µg/L		0/13	10–400	ND		360 N			No	IFD
117-84-0	Di-n-octyl phthalate	–		–		µg/L		0/13	10–400	ND		150 N			No	IFD
118-74-1	Hexachlorobenzene	–		–		µg/L		0/13	10–400	ND		0.042 C	1.0	MCL	No	IFD
87-68-3	Hexachlorobutadiene	–		–		µg/L		0/13	10–400	ND		0.86 C			No	IFD
77-47-4	Hexachlorocyclopentadier	–		–		µg/L		0/13	10–400	ND		22 N	50	MCL	No	IFD
67-72-1	Hexachloroethane	–		–		µg/L		0/13	10–400	ND		3.6 N			No	IFD
78-59-1	Isophorone	–		–		µg/L		0/13	10–400	ND		71 C			No	IFD
98-95-3	Nitrobenzene	–		–		µg/L		0/13	10–400	ND		0.34 N			No	IFD
62-75-9	N-nitroso dimethylamine	–		–		µg/L		0/1	10–10	ND		0.0013 C			No	IFD
621-64-7	N-nitroso-di-n-propylamine	–		–		µg/L		0/13	10–400	ND		0.0096 C			No	IFD
86-30-6	N-nitrosodiphenylamine	–		–		µg/L		0/13	10–400	ND		14 C			No	IFD
87-86-5	Pentachlorophenol	–		–		µg/L		0/13	10–1000	ND		0.56 C	1.0	MCL	No	IFD
108-95-2	Phenol	–		–		µg/L		0/13	10–400	ND		2200 N			No	IFD
71-55-6	1,1,1-Trichloroethane	–		–		µg/L		0/12	10–10	ND		320 N	200	MCL	No	IFD
79-34-5	1,1,2,2-Tetrachloroethane	–		–		µg/L		0/12	10–25	ND		0.055 C			No	IFD
79-00-5	1,1,2-Trichloroethane	–		–		µg/L		0/12	10–10	ND		0.2 C	5.0	MCL	No	IFD
75-34-3	1,1-Dichloroethane	–		–		µg/L		0/12	10–10	ND		81 N			No	IFD
75-35-4	1,1-Dichloroethene	–		–		µg/L		0/12	10–10	ND		34 N	7.0	MCL	No	IFD
107-06-2	1,2-Dichloroethane	–		–		µg/L		0/12	10–10	ND		0.12 C	5.0	MCL	No	IFD
540-59-0	1,2-Dichloroethene isomer	2		45		µg/L	MW-2	2/12	10–10	45		6.1 N[d]	70	MCL	**Yes**	ASL
78-87-5	1,2-Dichloropropane	–		–		µg/L		0/12	10–10	ND		0.16 C	5.0	MCL	No	IFD
78-93-3	2-Butanone	26	J	26	J	µg/L	MW-2	1/12	10–10	26		190 N			No	BSL
591-78-6	2-Hexanone	–		–		µg/L		0/12	10–10	ND		N/A			No	IFD
108-10-1	4-Methyl-2-pentanone	31		31		µg/L	MW-1	1/12	10–10	31		16 N			**Yes**	ASL
67-64-1	Acetone	100	J	100	J	µg/L	MW-2	1/12	10–150	100		61 N			**Yes**	ASL
71-43-2	Benzene	1.2		140		µg/L	MW-2	8/27	1–10	140		0.34 C	5.0	MCL	**Yes**	ASL
75-27-4	Bromodichloromethane	–		–		µg/L		0/12	10–10	ND		0.18 C			No	IFD

Table 2.8
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]	Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection
75-25-2	Bromoform	–		–		µg/L		0/12	10–10	ND		8.5 C			No	IFD
74-83-9	Bromomethane	–		–		µg/L		0/12	10–10	ND		0.87 N			No	IFD
75-15-0	Carbon disulfide	16		16		µg/L	MW-2	1/12	10–10	16		100 N			No	BSL
56-23-5	Carbon tetrachloride	–		–		µg/L		0/12	10–10	ND		0.17 C			No	IFD
108-90-7	Chlorobenzene	1.9		28		µg/L	MW-1	8/27	4–10	28		11 N	100	MCL	Yes	ASL
75-00-3	Chloroethane	20	J	20	J	µg/L	MW-2	1/12	10–10	20		4.6 C			Yes	ASL
67-66-3	Chloroform	–		–		µg/L		0/12	10–10	ND		0.62 N			No	IFD
74-87-3	Chloromethane	–		–		µg/L		0/12	10–10	ND		1.5 C			No	IFD
10061-01-5	cis-1,3-Dichloropropene	–		–		µg/L		0/12	10–10	ND		0.4 C			No	IFD
124-48-1	Dibromochloromethane	–		–		µg/L		0/12	10–10	ND		0.13 C			No	IFD
100-41-4	Ethylbenzene	120		120		µg/L	MW-1	1/12	10–10	120		130 N[e]	700	MCL	No	ASL
136777-61-2	meta & para Xylenes	51		51		µg/L	MW-1	1/15	5–5	51		21 N			Yes	ASL
75-09-2	Methylene chloride	–		–		µg/L		0/12	10–10	ND		4.3 C			No	IFD
95-47-6	ortho-Xylene	22		22		µg/L	MW-2	1/15	5–5	22		21 N			Yes	ASL
100-42-5	Styrene	–		–		µg/L		0/12	10–10	ND		160 N			No	IFD
127-18-4	Tetrachloroethene	–		–		µg/L		0/12	10–10	ND		0.66 C	5.0	MCL	No	IFD
108-88-3	Toluene	330		1700		µg/L	MW-1	2/27	5–10	1700		72 N	1000	MCL	Yes	ASL
10061-02-6	trans-1,3-Dichloropropene	–		–		µg/L		0/12	10–10	ND		0.4 C			No	IFD
79-01-6	Trichloroethene	–		–		µg/L		0/12	10–10	ND		0.028 C	5.0	MCL	No	IFD
75-01-4	Vinyl chloride	–		–		µg/L		0/12	10–10	ND		0.02 C	2.0	MCL	No	IFD
1330-20-7	Xylene isomers (total)	390		390		µg/L	MW-1	1/12	10–10	390		21 N	10000	MCL	Yes	ASL
	PAHs															
91-57-6	2-Methylnaphthalene	1		1		µg/L	MW-2	2/13	10–400	1		0.62 N[f]			Yes	ASL
83-32-9	Acenaphthene	2		2		µg/L	MW-2	1/13	10–400	2		37 N			No	BSL
208-96-8	Acenaphthylene	–		–		µg/L		0/13	10–400	ND		0.62 N[f]			No	IFD
120-12-7	Anthracene	–		–		µg/L		0/13	10–400	ND		180 N			No	IFD
56-55-3	Benz[a]anthracene	–		–		µg/L		0/13	10–400	ND		0.092 C	0.2	MCL	No	IFD
50-32-8	Benzo[a]pyrene	–		–		µg/L		0/13	10–400	ND		0.0092 C			No	IFD
205-99-2	Benzo[b]fluoranthene	–		–		µg/L		0/13	10–400	ND		0.092 C			No	IFD
191-24-2	Benzo[ghi]perylene	–		–		µg/L		0/13	10–400	ND		0.62 N[f]			No	IFD
207-08-9	Benzo[k]fluoranthene	–		–		µg/L		0/13	10–400	ND		0.92 C			No	IFD
218-01-9	Chrysene	–		–		µg/L		0/13	10–400	ND		9.2 C			No	IFD
53-70-3	Dibenz[a,h]anthracene	–		–		µg/L		0/13	10–400	ND		0.0092 C			No	IFD
206-44-0	Fluoranthene	–		–		µg/L		0/13	10–400	ND		150 N			No	IFD
86-73-7	Fluorene	–		–		µg/L		0/13	10–400	ND		24 N			No	IFD
193-39-5	Indeno[1,2,3-cd]pyrene	–		–		µg/L		0/13	10–400	ND		0.092 C			No	IFD
91-20-3	Naphthalene	9		100		µg/L	MW-2	2/13	10–10	100		0.62 N			Yes	ASL
85-01-8	Phenanthrene	–		–		µg/L		0/13	10–400	ND		18 N[g]			No	IFD
129-00-0	Pyrene	–		–		µg/L		0/13	10–400	ND		18 N			No	IFD

Note: All results reported as unfiltered.
For the purposes of screening, field replicates have been averaged.
– - either no detected or undetected values
ARAR - applicable or relevant and appropriate requirement
C - carcinogenic based on a cancer risk of 1×10^{-6}
CoPC - chemical of potential concern
J - estimated value
MCL - maximum contaminant level

Rationale Codes:
Selection Reason:
ASL - above screening levels
HIST - infrequent detection but associated historically
Deletion Reason:
BKG - below or consistent with background levels
BSL - below screening level
IFD - infrequent detection

Table 2.8
Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]	Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Substance Deletion or Selection

N - noncarcinogenic based on hazard quotient of 0.1
N/A - not applicable
ND - not detected
TT - Treatment technique action level
PAH - polycyclic aromatic hydrocarbon
PRG - preliminary remediation goal
Q - qualifier
TBC - to be considered
NTX - no toxicity information
NUT - essential nutrient

[a] Screening toxicity values for soil are the PRGs taken from U.S. EPA Region IX (2003a). PRGs correspond to 1×10^{-6} or a hazard quotient of 0.1, whichever is lower.
[b] This default non-carcinogenic screening value for chromium is that for chromium(VI).
[c] Methylmercury is included as a CoPC at the request of the New Jersey Department of Environmental Protection and U.S. EPA Region II reviewers.
[d] This default non-carcinogenic screening value is that for *cis*-1,2-dichloroethene.
[e] Screened based on RfD and RFC verified in IRIS. Region 9 provides a screening value of 2.9 µg/L based on NCEA carcinogenicity data.
[f] This default screening value is that for naphthalene, the noncarcinogenic PAH with the most stringent risk-based concentration/PRG.
[g] Based on the risk-based concentration for pyrene. There is no EPA-derived toxicity value for phenanthrene. NJDEP and EPA indicated that the toxicity value for pyrene should be applied (NJDEP 2001).

Table 2.9

Occurrence, distribution and selection of chemicals of potential concern
Ventron/Velsicol Site OU1

Scenario Timeframe	Current/Future
Medium:	Soil
Exposure Medium:	Air
Exposure Point:	Outdoor air

CAS Registry Number	Analyte	Minimum detected value	Q	Maximum detected value	Q	Concentration units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Values[a]		Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	CoPC Flag	Rationale for Contaminant Deletion or Selection
Indoor Air																	
	Mercury Vapor	10.95		30.4		ng/m³	A1	5/5	–	30.4	N/A	31	N			No	BSL
Outdoor Air																	
	Mercury Vapor	1.42		60.6		ng/m³	A4	11/11	–	60.6	N/A	31	N			**Yes**	ASL

Note: All results reported as dry weight.

– - no undetected value
ARAR - applicable or relevant and appropriate requirement
C - carcinogenic based on a cancer risk of 1×10^{-6}
CoPC - chemical of potential concern
N - noncarcinogenic based on hazard quotient of 0.1
N/A - not applicable
PRG - preliminary remediation goal
Q - qualifier
TBC - to be considered

Rationale Codes:

Selection Reason:
ASL - above screening levels
HIST - infrequent detection but associated historically

Deletion Reason:
BKG - below or consistent with background levels
BSL - below screening level
IFD - infrequent detection
NTX - no toxicity information
NUT - essential nutrient

[a] Screening toxicity values for air are the ambient air PRGs taken from U.S. EPA Region IX (2003a). PRGs correspond to 1×10^{-6} or a hazard quotient of 0.1, whichever is lower.

Table 2.10. Relative contribution of inhalation of chemicals in outdoor air exposure pathway to risk-based concentrations for CoPCs in soil

	EPA Region 9 Residential Soil PRG				Maximum Soil/Sediment	
Chemical	Inhalation	Dermal	Ingestion	Combined	Subsurface	Surface soil/sedt
Metals						
Aluminum	2,882,040		78,214	76,142	108,000	13,900
Antimony	117,340		31	31	97.3	53.7
Arsenic	588	4.5	0.43	0.39	120	26.4
Barium	294,086		5,475	5,375	11,200	608
Cadmium	1,405	698	39	37	36.1	21.2
Chromium(VI)	30			30	9,840	1,150
Cobalt	903			903	42.5	14.4
Copper			3,129	3,129	10,500	7,420
Iron			23,464	23,463	293,000	122,000
Lead [a]				400	58,200	4,320
Manganese	28,820		1,877	1,762	23,300	3,090
Mercury (total)			23	23	34,700	13,800
Methylmercury		28	7.8	6.1	7.4	0.32
Nickel			1,564	1,564	317	193
Nickel (refinery dust)	10,534			10,534	317	193
Selenium			391	391	6.4	2.0
Silver			391	391	1,580	93.8
Thallium			5.2	5.2	12.9	21.9
Vanadium			548	547	980	245
Zinc			23,464	23,463	43,200	25,400
Organics						
Acetone	1,964		7,821	1,570	0.22	0.19
Benzene	0.63		11.6	0.60	2.8	2.8
bis[2-ethylhexyl]phthalate	632,026	145	45.7	34.7	22	380
Chloroethane	3.1		221	3.0	ND	ND
Carbazole	442,418	101	32	24	25	0.93
Chlorobenzene	167		1,564	151	0.010	0.0012
1,2-Dichloroethene, isomers [b]	45.4		782.1	42.9	ND	ND
1,4-Dichlorobenzene	4.0		26.7	3.4	0.20	ND
Ethylbenzene	2,448		7,821	1,864	0.91	ND
4-Methyl-2-pentanone					ND	ND
4-Methyl phenol	10,293,000	1,397	391	306	0.41	ND
Toluene	685		15,643	656	70	0.011
Xylene isomers (total)	277	195,536	54,750	275	110	ND
PAHs						
2-Methylnaphthalene [c]	58		1,564	56	11	0.19
Benz[a]anthracene	12,121	2.13	0.88	0.62	62	4.0
Benzo[a]pyrene	1,212	0.21	0.09	0.06	52	10
Benzo[b]fluoranthene	12,121	2.13	0.88	0.62	64	13
Benzo[k]fluoranthene	121,211	21	8.8	6.2	16	4.7
Chrysene	1,212,105	213	88	62	61	12
Dibenz[a,h]anthracene	1,212	0.21	0.09	0.06	1.3	0.90
Fluoranthene	82,344,000	8,595	3,129	2,294	130	26
Indeno[1,2,3-cd]pyrene	12,121	2.1	0.88	0.62	20	2.6
Naphthalene	58		1,564	56	22	0.63
PCBs	4,424	0.72	0.32	0.22	5.2	4.4

Note: All values in mg/kg.

Box indicates the maximum value exceeds the inhalation risk-based concentration for that analyte.

[a] Lead screening value based on the IEUBK lead model.

[b] These non-carcinogenic screening value are those for *cis*-1,2-dichloroethene.

[c] These screening values are those for naphthalene, the noncarcinogenic PAH with the most stringent risk-based concentration/PRG.

Table 3.1

Medium-specific exposure point concentration summary
Ventron/Velsicol Site OU1

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Surface soil
Exposure Point:	Developed Area surface soil

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum detected value	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Current (unpaved)												
Aluminum	mg/kg	8.1E+03	n<10	1.2E+04		mg/kg	1.2E+04	Max	n<10	1.2E+04	Max	n<10
Arsenic	mg/kg	8.4E+00	n<10	1.1E+01		mg/kg	1.1E+01	Max	n<10	1.1E+01	Max	n<10
Chromium	mg/kg	4.2E+01	n<10	9.7E+01	J	mg/kg	9.7E+01	Max	n<10	9.7E+01	Max	n<10
Copper	mg/kg	1.9E+02	n<10	4.7E+02	J	mg/kg	4.7E+02	Max	n<10	4.7E+02	Max	n<10
Iron	mg/kg	1.5E+04	n<10	2.3E+04		mg/kg	2.3E+04	Max	n<10	2.3E+04	Max	n<10
Manganese	mg/kg	3.6E+02	n<10	5.4E+02	J	mg/kg	5.4E+02	Max	n<10	5.4E+02	Max	n<10
Mercury (total)	mg/kg	1.2E+02	n<10	3.1E+02		mg/kg	3.1E+02	Max	n<10	3.1E+02	Max	n<10
Vanadium	mg/kg	6.7E+01	n<10	1.4E+02		mg/kg	1.4E+02	Max	n<10	1.4E+02	Max	n<10
Benzo[a]pyrene	µg/kg	4.1E+02	n<10	4.1E+02		µg/kg	4.1E+02	Max	n<10	4.1E+02	Max	n<10
Benzo[b]fluoranthene	µg/kg	4.1E+02	n<10	7.5E+02		µg/kg	7.5E+02	Max	n<10	7.5E+02	Max	n<10
Dibenz[a,h]anthracene	µg/kg	7.1E+01	n<10	7.1E+01		µg/kg	7.1E+01	Max	n<10	7.1E+01	Max	n<10
Future (all)												
Aluminum	mg/kg	7.0E+03	n<10	1.2E+04		mg/kg	1.2E+04	Max	n<10	1.2E+04	Max	n<10
Arsenic	mg/kg	6.0E+00	1.3E+01	1.1E+01		mg/kg	1.1E+01	Max	W-Test (2)	1.1E+01	Max	W-Test (2)
Chromium	mg/kg	3.4E+01	7.6E+01	1.3E+02		mg/kg	7.6E+01	95% UCL-T	W-Test (1)	7.6E+01	95% UCL-T	W-Test (1)
Copper	mg/kg	6.5E+02	6.9E+02	7.4E+03		mg/kg	6.9E+02	95% UCL-T	W-Test (4)	6.9E+02	95% UCL-T	W-Test (4)
Iron	mg/kg	1.3E+04	2.2E+04	2.4E+04		mg/kg	2.2E+04	95% UCL-T	W-Test (1)	2.2E+04	95% UCL-T	W-Test (1)
Manganese	mg/kg	2.6E+02	4.0E+02	5.4E+02	J	mg/kg	4.0E+02	95% UCL-T	W-Test (1)	4.0E+02	95% UCL-T	W-Test (1)
Mercury (total)[a]	mg/kg	6.9E+02	5.3E+03	2.3E+03		mg/kg	2.3E+03	Max	W-Test (2)	2.3E+03	Max	W-Test (2)
Thallium	mg/kg	3.3E+00	2.4E+00	5.4E+00		mg/kg	2.4E+00	95% UCL-T	W-Test (4)	2.4E+00	95% UCL-T	W-Test (4)
Vanadium	mg/kg	4.0E+01	n<10	1.4E+02		mg/kg	1.4E+02	Max	n<10	1.4E+02	Max	n<10
Benzene	µg/kg	7.0E+02	2.9E+02	2.8E+03	J	µg/kg	2.9E+02	95% UCL-T	W-Test (4)	2.9E+02	95% UCL-T	W-Test (4)
Benz[a]anthracene	µg/kg	6.0E+02	8.5E+02	1.4E+03		µg/kg	8.5E+02	95% UCL-T	W-Test (1)	8.5E+02	95% UCL-T	W-Test (1)
Benzo[a]pyrene	µg/kg	5.0E+02	6.8E+02	1.1E+03		µg/kg	6.8E+02	95% UCL-T	W-Test (1)	6.8E+02	95% UCL-T	W-Test (1)
Benzo[b]fluoranthene	µg/kg	6.0E+02	1.1E+03	1.4E+03		µg/kg	1.1E+03	95% UCL-T	W-Test (1)	1.1E+03	95% UCL-T	W-Test (1)
Dibenz[a,h]anthracene	µg/kg	9.0E+01	1.7E+02	1.5E+02		µg/kg	1.5E+02	Max	W-Test (2)	1.5E+02	Max	W-Test (2)

Note: EPC - exposure point concentration
UCL - upper confidence limit

Duplicate sample results were averaged in calculations.
Distributional fits were assessed using the Shapiro-Wilk goodness-of-fit test, except where N>50, then the Shapiro-Francia goodness-of-fit test was used.
Arithmetic mean was calculated using detected data only.
95% UCL of data was calculated using half the detection limit for undetected analytes. 95% UCL was not calculated for less than 10 data points.
95% UCL-N - 95% UCL of normal data
95% UCL-T - 95% UCL of log-transformed data

(1) Shapiro-Wilk W-Test indicates data are lognormally distributed

(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum detected concentration used for EPC.

(3) Shapiro-Wilk W-Test indicates data are normally distributed.

(4) Data are not lognormally distributed or normally distributed. Non-parametric method was used.

[a] Sample SS-04 with a concentration of 13,800 mg/kg was identified as a hot spot and excluded. Section 6 provides risk estimates with sample result included.

Table 3.2
Medium-specific exposure point concentration summary
Ventron/Velsicol Site OU1

Scenario Timeframe:	Current/Future
Medium:	Soil/sediment
Exposure Medium:	Surface soil/sediment
Exposure Point:	Undeveloped Area surface soil/sediment

							Reasonable Maximum Exposure			Central Tendency		
Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum detected value	Maximum Qualifier	EPC Units	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Soils												
Aluminum	mg/kg	5.0E+03	6.2E+03	1.1E+04		mg/kg	6.16E+03	95% UCL-N	W-Test (3)	6.2E+03	95% UCL-N	W-Test (3)
Antimony	mg/kg	7.4E+00	1.3E+01	5.4E+01		mg/kg	1.3E+01	95% UCL-T	W-Test (1)	1.3E+01	95% UCL-T	W-Test (1)
Arsenic	mg/kg	8.5E+00	9.6E+00	2.6E+01		mg/kg	9.6E+00	95% UCL-T	W-Test (4)	9.6E+00	95% UCL-T	W-Test (4)
Barium	mg/kg	9.0E+02	1.5E+03	1.2E+04		mg/kg	1.5E+03	95% UCL-T	W-Test (4)	1.5E+03	95% UCL-T	W-Test (4)
Cadmium	mg/kg	6.2E+00	1.5E+01	3.1E+01		mg/kg	1.5E+01	95% UCL-T	W-Test (1)	1.5E+01	95% UCL-T	W-Test (1)
Chromium	mg/kg	3.5E+02	3.9E+02	8.2E+03		mg/kg	3.9E+02	95% UCL-T	W-Test (4)	3.9E+02	95% UCL-T	W-Test (4)
Copper	mg/kg	1.9E+02	5.9E+02	1.0E+03	J	mg/kg	5.9E+02	95% UCL-T	W-Test (1)	5.9E+02	95% UCL-T	W-Test (1)
Iron	mg/kg	2.4E+04	3.5E+04	1.2E+05	J	mg/kg	3.5E+04	95% UCL-T	W-Test (4)	3.5E+04	95% UCL-T	W-Test (4)
Lead	mg/kg	6.6E+02	1.2E+03	4.8E+04	J	mg/kg	2.3E+03	95% UCL-T	W-Test (4)	2.3E+03	95% UCL-T	W-Test (4)
Manganese	mg/kg	3.6E+02	6.8E+02	3.1E+03	J	mg/kg	6.8E+02	95% UCL-T	W-Test (4)	6.8E+02	95% UCL-T	W-Test (4)
Mercury (total)[a]	mg/kg	1.1E+02	5.1E+02	5.9E+02		mg/kg	5.1E+02	95% UCL-T	W-Test (4)	5.1E+02	95% UCL-T	W-Test (4)
Methylmercury	mg/kg	4.0E-02	1.4E-01	3.2E-01		mg/kg	3.2E-01	Max	n<10	3.2E-01	Max	n<10
Nickel	mg/kg	3.9E+01	5.1E+01	1.9E+02		mg/kg	5.1E+01	95% UCL-T	W-Test (4)	5.1E+01	95% UCL-T	W-Test (4)
Silver	mg/kg	9.0E+00	2.2E+01	9.4E+01		mg/kg	2.2E+01	95% UCL-T	W-Test (1)	2.2E+01	95% UCL-T	W-Test (1)
Thallium	mg/kg	1.3E+01	4.2E+00	2.2E+01		mg/kg	4.2E+00	95% UCL-T	W-Test (4)	4.2E+00	95% UCL-T	W-Test (4)
Vanadium	mg/kg	4.9E+01	7.3E+01	2.5E+02		mg/kg	7.3E+01	95% UCL-T	W-Test (4)	7.3E+01	95% UCL-T	W-Test (4)
Zinc	mg/kg	1.0E+04	1.8E+04	1.9E+05		mg/kg	1.8E+04	95% UCL-T	W-Test (1)	1.8E+04	95% UCL-T	W-Test (1)
Aroclor® 1248	µg/kg	4.4E+03	1.2E+04	4.4E+03		µg/kg	4.4E+03	Max	n<10	4.4E+03	Max	n<10
2-Methylnaphthalene	µg/kg	3.1E+03	2.5E+03	1.5E+04		µg/kg	2.5E+03	95% UCL-T	W-Test (4)	2.5E+03	95% UCL-T	W-Test (4)
Benz[a]anthracene	µg/kg	8.0E+02	2.4E+03	4.0E+03		µg/kg	2.4E+03	95% UCL-T	W-Test (1)	2.4E+03	95% UCL-T	W-Test (1)
Benzo[a]pyrene	µg/kg	1.0E+03	2.8E+03	1.0E+04		µg/kg	2.8E+03	95% UCL-T	W-Test (1)	2.8E+03	95% UCL-T	W-Test (1)
Benzo[b]fluoranthene	µg/kg	2.0E+03	3.2E+03	1.3E+04		µg/kg	3.2E+03	95% UCL-T	W-Test (1)	3.2E+03	95% UCL-T	W-Test (1)
bis[2-Ethylhexyl]phthalate	µg/kg	5.0E+04	4.9E+04	3.8E+05		µg/kg	4.9E+04	95% UCL-T	W-Test (4)	4.9E+04	95% UCL-T	W-Test (4)
Dibenz[a,h]anthracene	µg/kg	2.0E+02	2.2E+03	9.0E+02		µg/kg	9.0E+02	Max	W-Test (4)	9.0E+02	Max	W-Test (4)
Indeno[1,2,3-cd]pyrene	µg/kg	6.0E+02	1.7E+03	2.6E+03		µg/kg	1.7E+03	95% UCL-T	W-Test (1)	1.7E+03	95% UCL-T	W-Test (1)
Naphthalene	µg/kg	1.7E+04	5.1E+03	1.2E+05		µg/kg	5.1E+03	95% UCL-T	W-Test (4)	5.1E+03	95% UCL-T	W-Test (4)
Sediments												
Aluminum	mg/kg	9.9E+03	n<10	1.4E+04		mg/kg	1.4E+04	Max	n<10	1.4E+04	Max	n<10
Arsenic	mg/kg	5.0E+00	n<10	8.8E+00		mg/kg	8.8E+00	Max	n<10	8.8E+00	Max	n<10
Cadmium	mg/kg	3.7E+00	n<10	9.1E+00		mg/kg	9.1E+00	Max	n<10	9.1E+00	Max	n<10
Chromium	mg/kg	1.0E+02	n<10	1.6E+02		mg/kg	1.6E+02	Max	n<10	1.6E+02	Max	n<10
Iron	mg/kg	1.8E+04	n<10	2.1E+04		mg/kg	2.1E+04	Max	n<10	2.1E+04	Max	n<10
Mercury (total)	mg/kg	6.9E+02	n<10	1.3E+03		mg/kg	1.3E+03	Max	n<10	1.3E+03	Max	n<10
Methylmercury	mg/kg	6.3E-02	n<10	1.3E-01		mg/kg	1.26E-01	Max	n<10	1.3E-01	Max	n<10
Thallium	mg/kg	3.8E+00	n<10	4.8E+00		mg/kg	4.8E+00	Max	n<10	4.8E+00	Max	n<10
Vanadium	mg/kg	5.7E+01	n<10	6.9E+01		mg/kg	6.9E+01	Max	n<10	6.9E+01	Max	n<10
Zinc	mg/kg	1.4E+03	n<10	3.5E+03		mg/kg	3.5E+03	Max	n<10	3.5E+03	Max	n<10
Aroclor® 1248	µg/kg	2.1E+02	n<10	2.4E+02		µg/kg	2.4E+02	Max	n<10	2.4E-01	Max	n<10
Aroclor® 1260	µg/kg	3.7E+02	n<10	4.9E+02		µg/kg	4.9E+02	Max	n<10	4.9E-01	Max	n<10

Table 3.2
Medium-specific exposure point concentration summary
Ventron/Velsicol Site OU1

Scenario Timeframe:	Current/Future
Medium:	Soil/sediment
Exposure Medium:	Surface soil/sediment
Exposure Point:	Undeveloped Area surface soil/sediment

							Reasonable Maximum Exposure			Central Tendency		
Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum detected value	Maximum Qualifier	EPC Units	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Sum 1248 and 1260	µg/kg	5.9E+02	n<10	7.3E+02		µg/kg	7.3E+02	Max	n<10	7.3E-01	Max	n<10
Benz[a]anthracene	µg/kg	7.0E+02	n<10	1.7E+03		µg/kg	1.7E+03	Max	n<10	1.7E+00	Max	n<10
Benzo[a]pyrene	µg/kg	7.0E+02	n<10	1.6E+03		µg/kg	1.6E+03	Max	n<10	1.6E+00	Max	n<10
Benzo[b]fluoranthene	µg/kg	8.0E+02	n<10	1.8E+03		µg/kg	1.8E+03	Max	n<10	1.8E+00	Max	n<10
Dibenz[a,h]anthracene	µg/kg	2.0E+02	n<10	3.2E+02		µg/kg	3.2E+02	Max	n<10	3.2E+02	Max	n<10
Indeno[1,2,3-cd]pyrene	µg/kg	5.0E+02	n<10	1.2E+03		µg/kg	1.2E+03	Max	n<10	1.2E+00	Max	n<10

Note: EPC - exposure point concentration
UCL - upper confidence limit
Duplicate sample results were averaged in calculations.
Distributional fits were assessed using the Shapiro-Wilk goodness-of-fit test, except where N>50, then the Shapiro-Francia goodness-of-fit test was used.
Arithmetic mean was calculated using detected data only.
95% UCL of data was calculated using half the detection limit for undetected analytes. 95% UCL was not calculated for less than 10 data points.
95% UCL-N - 95% UCL of normal data
95% UCL-T - 95% UCL of log-transformed data

(1) Shapiro-Wilk W-Test indicates data are lognormally distributed

(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum detected concentration used for EPC.

(3) Shapiro-Wilk W-Test indicates data are normally distributed.

(4) Data are not lognormally distributed or normally distributed. Non-parametric method was used.

[a] Sample HS-5, with a concentration of 295,000 mg/kg, was identified as a hot spot and was excluded. Section 6 provides risk estimates with this sample included.

Table 3.3

Medium-specific exposure point concentration summary
Ventron/Velsicol Site OU1

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Subsurface soil
Exposure Point:	Developed Area subsurface soil (1-20 ft depths)

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum detected value	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Arsenic	mg/kg	6.7E+00	n<10	9.9E+00		mg/kg	9.9E+00	Max	n<10	9.9E+00	Max	n<10
Barium	mg/kg	3.1E+02	n<10	8.2E+02		mg/kg	8.2E+02	Max	n<10	8.2E+02	Max	n<10
Chromium	mg/kg	4.6E+01	n<10	1.3E+02		mg/kg	1.3E+02	Max	n<10	1.3E+02	Max	n<10
Copper	mg/kg	1.7E+03	n<10	7.4E+03		mg/kg	7.4E+03	Max	n<10	7.4E+03	Max	n<10
Iron	mg/kg	2.1E+04	n<10	3.5E+04		mg/kg	3.5E+04	Max	n<10	3.5E+04	Max	n<10
Manganese	mg/kg	4.9E+02	n<10	8.1E+02		mg/kg	8.1E+02	Max	n<10	8.1E+02	Max	n<10
Mercury (total)	mg/kg	6.2E+02	1.3E+03	5.2E+03		mg/kg	1.3E+03	95% UCL-T	W-Test (4)	1.3E+03	95% UCL-T	W-Test (4)
Thallium	mg/kg	3.1E+00	n<10	5.4E+00		mg/kg	5.4E+00	Max	n<10	5.4E+00	Max	n<10
2-Methylnaphthalene[a]	µg/kg	1.1E+04	n<10	1.1E+04		µg/kg	4.5E+02	Max	n<10	4.5E+02	Max	n<10
Aroclor® 1260	µg/kg	3.6E+02	n<10	3.6E+02		µg/kg	3.6E+02	Max	n<10	3.6E+02	Max	n<10
Total PCBs (sum)	µg/kg	3.6E+02	n<10	3.6E+02		µg/kg	3.6E+02	Max	n<10	3.6E+02	Max	n<10
Benzene	µg/kg	8.0E+02	n<10	2.8E+03	J	µg/kg	2.8E+03	Max	n<10	2.8E+03	Max	n<10

Note: EPC - exposure point concentration
UCL - upper confidence limit
Duplicate sample results were averaged in calculations.
Distributional fits were assessed using the Shapiro-Wilk goodness-of-fit test, except where N>50, then the Shapiro-Francia goodness-of-fit test was used.
Arithmetic mean was calculated using detected data only.
95% UCL of data was calculated using half the detection limit for undetected analytes. 95% UCL was not calculated for less than 10 data points.
95% UCL-N - 95% UCL of normal data
95% UCL-T - 95% UCL of log-transformed data

(1) Shapiro-Wilk W-Test indicates data are lognormally distributed
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum detected concentration used for EPC.
(3) Shapiro-Wilk W-Test indicates data are normally distributed.
(4) Data are not lognormally distributed or normally distributed. Non-parametric method was used.

[a] Subsurface soil concentrations for 2-methylnaphthalene in the developed area were evaluated based on data for the undeveloped area (EPC 4.5E+02 µg/kg) because of limited sampling data in the developed area. The UCL for the developed area would be 1.1E+-4 µg/kg, which is the single sample result for the developed area.

Table 3.4
Medium-specific exposure point concentration summary
Ventron/Velsicol Site OU1

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Subsurface soil
Exposure Point:	Undeveloped Area subsurface soil (1-20 ft depths)

							Reasonable Maximum Exposure			Central Tendency		
Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum detected value	Maximum Qualifier	EPC Units	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Aluminum	mg/kg	1.0E+04	1.4E+04	1.1E+05		mg/kg	1.4E+04	95% UCL-T	W-Test (4)	1.4E+04	95% UCL-T	W-Test (4)
Antimony	mg/kg	1.0E+01	1.4E+01	9.7E+01		mg/kg	1.4E+01	95% UCL-T	W-Test (4)	1.4E+01	95% UCL-T	W-Test (4)
Arsenic	mg/kg	1.7E+01	2.2E+01	1.2E+02		mg/kg	2.2E+01	95% UCL-T	W-Test (4)	2.2E+01	95% UCL-T	W-Test (4)
Barium	mg/kg	8.0E+02	1.2E+03	1.1E+04		mg/kg	1.2E+03	95% UCL-T	W-Test (4)	1.2E+03	95% UCL-T	W-Test (4)
Cadmium	mg/kg	6.0E+00	1.2E+01	3.6E+01		mg/kg	1.2E+01	95% UCL-T	W-Test (1)	1.2E+01	95% UCL-T	W-Test (1)
Chromium	mg/kg	3.0E+02	3.1E+02	9.8E+03		mg/kg	3.1E+02	95% UCL-T	W-Test (4)	3.1E+02	95% UCL-T	W-Test (4)
Copper	mg/kg	4.5E+02	9.6E+02	8.7E+03	J	mg/kg	9.6E+02	95% UCL-T	W-Test (4)	9.6E+02	95% UCL-T	W-Test (4)
Iron	mg/kg	4.6E+04	7.5E+04	3.2E+05		mg/kg	7.5E+04	95% UCL-T	W-Test (4)	7.5E+04	95% UCL-T	W-Test (4)
Lead	mg/kg	2.1E+03	2.3E+03	5.8E+04		mg/kg	2.1E+03	Mean	W-Test (5)	2.1E+03	Mean	W-Test (5)
Manganese	mg/kg	8.0E+02	8.1E+02	2.3E+04	J	mg/kg	8.1E+02	95% UCL-T	W-Test (4)	8.1E+02	95% UCL-T	W-Test (4)
Mercury (total)	mg/kg	5.0E+02	7.4E+02	3.5E+04		mg/kg	7.4E+02	95% UCL-T	W-Test (1)	7.4E+02	95% UCL-T	W-Test (1)
Methylmercury	mg/kg	2.9E-03	n<10	7.4E-03		mg/kg	7.4E-03	Max	n<10	7.4E-03	Max	n<10
Nickel	mg/kg	6.4E+01	8.2E+01	3.2E+02		mg/kg	8.2E+01	95% UCL-T	W-Test (4)	8.2E+01	95% UCL-T	W-Test (4)
Selenium	mg/kg	4.5E+00	4.5E+00	4.3E+01		mg/kg	4.5E+00	95% UCL-T	W-Test (4)	4.5E+00	95% UCL-T	W-Test (4)
Silver	mg/kg	4.0E+01	3.7E+01	1.6E+03		mg/kg	3.7E+01	95% UCL-T	W-Test (4)	3.7E+01	95% UCL-T	W-Test (4)
Thallium	mg/kg	1.1E+01	2.6E+00	1.3E+01		mg/kg	2.6E+00	95% UCL-T	W-Test (4)	2.6E+00	95% UCL-T	W-Test (4)
Vanadium	mg/kg	6.9E+01	1.3E+02	9.8E+02		mg/kg	1.3E+02	95% UCL-T	W-Test (4)	1.3E+02	95% UCL-T	W-Test (4)
Zinc	mg/kg	2.3E+03	4.7E+03	4.3E+04		mg/kg	4.7E+03	95% UCL-T	W-Test (4)	4.7E+03	95% UCL-T	W-Test (4)
Aroclor® 1242	µg/kg	7.9E+02	n<10	7.9E+02		µg/kg	7.9E+02	Max	n<10	7.9E+02	Max	n<10
Aroclor® 1248	µg/kg	4.4E+03	n<10	4.4E+03		µg/kg	4.4E+03	Max	n<10	4.4E+03	Max	n<10
Aroclor® 1254	µg/kg	5.5E+02	n<10	5.5E+02		µg/kg	5.5E+02	Max	n<10	5.5E+02	Max	n<10
Total PCBs (sum)	µg/kg	4.4E+03	n<10	4.4E+03		µg/kg	4.4E+03	Max	n<10	4.4E+03	Max	n<10
2-Methylnaphthalene	µg/kg	9.0E+02	4.5E+02	8.8E+03		µg/kg	4.5E+02	95% UCL-T	W-Test (4)	4.5E+02	95% UCL-T	W-Test (4)
Benz[a]anthracene	µg/kg	2.8E+03	2.3E+03	6.2E+04		µg/kg	2.3E+03	95% UCL-T	W-Test (4)	2.3E+03	95% UCL-T	W-Test (4)
Benzo[a]pyrene	µg/kg	2.4E+03	1.9E+03	5.2E+04		µg/kg	1.9E+03	95% UCL-T	W-Test (4)	1.9E+03	95% UCL-T	W-Test (4)
Benzo[b]fluoranthene	µg/kg	3.0E+03	2.5E+03	6.4E+04		µg/kg	2.5E+03	95% UCL-T	W-Test (4)	2.5E+03	95% UCL-T	W-Test (4)
Benzo[ghi]perylene	µg/kg	1.0E+03	8.3E+02	1.9E+04		µg/kg	8.3E+02	95% UCL-T	W-Test (4)	8.3E+02	95% UCL-T	W-Test (4)
Benzo[k]fluoranthene	µg/kg	9.0E+02	7.4E+02	1.6E+04		µg/kg	7.4E+02	95% UCL-T	W-Test (4)	7.4E+02	95% UCL-T	W-Test (4)
Carbazole	µg/kg	2.2E+03	8.9E+02	2.5E+04		µg/kg	8.9E+02	95% UCL-T	W-Test (4)	8.9E+02	95% UCL-T	W-Test (4)
Dibenz[a,h]anthracene	µg/kg	1.8E+02	2.6E+02	1.3E+03		µg/kg	2.6E+02	95% UCL-T	W-Test (1)	2.6E+02	95% UCL-T	W-Test (1)
Indeno[1,2,3-cd]pyrene	µg/kg	1.1E+03	8.6E+02	2.0E+04		µg/kg	8.6E+02	95% UCL-T	W-Test (4)	8.6E+02	95% UCL-T	W-Test (4)
Naphthalene	µg/kg	1.9E+03	8.5E+02	2.2E+04		µg/kg	8.5E+02	95% UCL-T	W-Test (4)	8.5E+02	95% UCL-T	W-Test (4)
Toluene	µg/kg	1.2E+04	7.3E+03	7.0E+04		µg/kg	7.3E+03	95% UCL-T	W-Test (4)	7.3E+03	95% UCL-T	W-Test (4)
Xylenes	µg/kg	2.6E+04	1.1E+04	1.1E+05		µg/kg	1.1E+04	95% UCL-T	W-Test (4)	1.1E+04	95% UCL-T	W-Test (4)

Note: EPC - exposure point concentration
UCL - upper confidence limit
Duplicate sample results were averaged in calculations.
Distributional fits were assessed using the Shapiro-Wilk goodness-of-fit test, except where N>50, then the Shapiro-Francia goodness-of-fit test was used.
Arithmetic mean was calculated using detected data only.
95% UCL of data was calculated using half the detection limit for undetected analytes. 95% UCL was not calculated for less than 10 data points.
95% UCL-N - 95% UCL of normal data
95% UCL-T - 95% UCL of log-transformed data

(1) Shapiro-Wilk W-Test indicates data are lognormally distributed.
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum detected concentration used for EPC.
(3) Shapiro-Wilk W-Test indicates data are normally distributed.
(4) Data are not lognormally distributed or normally distributed. Non-parametric method was used.
(5) Mean detected concentration used for EPC in lead model (see text).

Table 3.5
Medium-specific exposure point concentration summary
Ventron/Velsicol Site OU1

Scenario Timeframe:	Current/Future
Medium:	Surface Water
Exposure Medium:	Surface Water
Exposure Point:	Undeveloped Area surface water

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum detected value	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Iron	ug/L	1.7E+03	n<10	2.6E+03		ug/L	2.6E+03	Max	n<10	2.6E+03	Max	n<10
Lead	ug/L	7.0E+00	n<10	1.9E+01		ug/L	1.9E+01	Max	n<11	1.9E+01	Max	n<11
Manganese	ug/L	2.9E+02	n<10	4.1E+02		ug/L	4.1E+02	Max	n<12	4.1E+02	Max	n<12
Mercury (total)	ug/L	5.0E+00	n<10	1.8E+01		ug/L	1.8E+01	Max	n<13	1.8E+01	Max	n<13
Methylmercury	ug/L	2.0E-03	n<10	2.8E-03		ug/L	2.8E-03	Max	n<14	2.8E-03	Max	n<14

Note: EPC - exposure point concentration
UCL - upper confidence limit
Duplicate sample results were averaged in calculations.
Distributional fits were assessed using the Shapiro-Wilk goodness-of-fit test, except where N>50, then the Shapiro-Francia goodness-of-fit test was used.
Arithmetic mean was calculated using detected data only.
95% UCL of data was calculated using half the detection limit for undetected analytes. 95% UCL was not calculated for less than 10 data points.
95% UCL-N - 95% UCL of normal data
95% UCL-T - 95% UCL of log-transformed data

(1) Shapiro-Wilk W-Test indicates data are lognormally distributed.
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum detected concentration used for EPC.
(3) Shapiro-Wilk W-Test indicates data are normally distributed.
(4) Data are not lognormally distributed or normally distributed. Non-parametric method was used.

Table 3.6
Medium-specific exposure point concentration summary
Ventron/Velsicol Site OU1

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Groundwater
Exposure Point:	Groundwater sitewide

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum detected value	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Arsenic	ug/L	1.6E+01	7.8E+00	4.2E+01		ug/L	7.8E+00	95% UCL-T	WTest (4)	7.8E+00	95% UCL-T	WTest (4)
Barium	ug/L	3.5E+02	4.1E+02	1.1E+03		ug/L	4.1E+02	95% UCL-T	WTest (4)	4.1E+02	95% UCL-T	WTest (4)
Cadmium	ug/L	2.0E+00	1.3E+00	5.7E+00		ug/L	1.3E+00	95% UCL-T	WTest (4)	1.3E+00	95% UCL-T	WTest (4)
Copper	ug/L	4.4E+01	1.6E+01	3.6E+02		ug/L	1.6E+01	95% UCL-T	WTest (4)	1.6E+01	95% UCL-T	WTest (4)
Iron	ug/L	1.3E+04	1.5E+04	3.8E+04		ug/L	1.5E+04	95% UCL-T	WTest (4)	1.5E+04	95% UCL-T	WTest (4)
Manganese	ug/L	1.5E+03	1.9E+03	6.6E+03		ug/L	1.9E+03	95% UCL-T	WTest (4)	1.9E+03	95% UCL-T	WTest (4)
Mercury (total)	ug/L	4.8E+00	8.3E+00	5.4E+01		ug/L	8.3E+00	95% UCL-T	WTest (4)	8.3E+00	95% UCL-T	WTest (4)
Methylmercury	ug/L	6.7E-03	2.3E-02	3.3E-02		ug/L	2.3E-02	95% UCL-T	WTest (1)	2.3E-02	95% UCL-T	WTest (1)
Nickel	ug/L	1.3E+01	2.2E+01	1.2E+02	J	ug/L	2.2E+01	95% UCL-T	WTest (4)	2.2E+01	95% UCL-T	WTest (4)
Thallium	ug/L	6.4E+00	2.9E+00	1.4E+01		ug/L	2.9E+00	95% UCL-T	WTest (4)	2.9E+00	95% UCL-T	WTest (4)
Vanadium	ug/L	1.5E+01	2.5E+01	6.3E+01		ug/L	2.5E+01	95% UCL-T	WTest (4)	2.5E+01	95% UCL-T	WTest (4)
1,4-Dichlorobenzene	ug/L	4.0E+00	2.0E+01	4.0E+00		ug/L	4.0E+00	Max	WTest (2)	4.0E+00	Max	WTest (2)
2-Methylnaphthalene	ug/L	1.0E+00	2.0E+01	1.0E+00		ug/L	1.0E+00	Max	WTest (2)	1.0E+00	Max	WTest (2)
4-Methylphenol	ug/L	3.2E+01	9.4E+00	6.2E+01		ug/L	9.4E+00	95% UCL-T	WTest (4)	9.4E+00	95% UCL-T	WTest (4)
Naphthalene	ug/L	5.0E+01	1.3E+01	1.0E+02		ug/L	1.3E+01	95% UCL-T	WTest (4)	1.3E+01	95% UCL-T	WTest (4)
4-Methyl-2-pentanone	ug/L	3.1E+01	7.2E+00	3.1E+01		ug/L	7.2E+00	95% UCL-T	WTest (4)	7.2E+00	95% UCL-T	WTest (4)
Acetone	ug/L	1.0E+02	5.3E+01	1.0E+02	J	ug/L	5.3E+01	95% UCL-T	WTest (4)	5.3E+01	95% UCL-T	WTest (4)
Benzene	ug/L	2.0E+01	1.0E+01	1.4E+02		ug/L	1.0E+01	95% UCL-T	WTest (4)	1.0E+01	95% UCL-T	WTest (4)
Chlorobenzene	ug/L	9.0E+00	8.1E+00	2.8E+01		ug/L	8.1E+00	95% UCL-T	WTest (4)	8.1E+00	95% UCL-T	WTest (4)
Chloroethane	ug/L	2.0E+01	6.3E+00	2.0E+01	J	ug/L	6.3E+00	95% UCL-T	WTest (4)	6.3E+00	95% UCL-T	WTest (4)
Toluene	ug/L	1.0E+03	2.7E+02	1.7E+03		ug/L	2.7E+02	95% UCL-T	WTest (4)	2.7E+02	95% UCL-T	WTest (4)
Xylene isomers	ug/L	3.9E+02	3.7E+01	3.9E+02		ug/L	3.7E+01	95% UCL-T	WTest (4)	3.7E+01	95% UCL-T	WTest (4)
1,2-Dichloroethene isomers	ug/L	2.4E+01	8.3E+00	4.5E+01		ug/L	8.3E+00	95% UCL-T	WTest (4)	8.3E+00	95% UCL-T	WTest (4)

Note: EPC - exposure point concentration
UCL - upper confidence limit
Duplicate sample results were averaged in calculations.
Distributional fits were assessed using the Shapiro-Wilk goodness-of-fit test, except where N>50, then the Shapiro-Francia goodness-of-fit test was used.
Arithmetic mean was calculated using detected data only.
95% UCL of data was calculated using half the detection limit for undetected analytes. 95% UCL was not calculated for less than 10 data points.
95% UCL-N - 95% UCL of normal data
95% UCL-T - 95% UCL of log-transformed data

(1) Shapiro-Wilk W-Test indicates data are lognormally distributed.

(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum detected concentration used for EPC.

(3) Shapiro-Wilk W-Test indicates data are normally distributed.

(4) Data are not lognormally distributed or normally distributed. Non-parametric method was used.

Table 3.7
Medium-specific exposure point concentration summary
Ventron/Velsicol Site OU1

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Air
Exposure Point:	Outdoor air

							Reasonable Maximum Exposure			Central Tendency		
Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum detected value	Maximum Qualifier	EPC Units	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Mercury vapor	ug/m^3	1.2E+01	3.3E-02	6.1E+01		ug/m^3	3.3E-02	95% UCL-T	W-Test (1)	3.3E-02	95% UCL-T	W-Test (1)

Note: EPC - exposure point concentration
UCL - upper confidence limit
Duplicate sample results were averaged in calculations.
Distributional fits were assessed using the Shapiro-Wilk goodness-of-fit test, except where N>50, then the Shapiro-Francia goodness-of-fit test was used.
Arithmetic mean was calculated using detected data only.
95% UCL of data was calculated using half the detection limit for undetected analytes. 95% UCL was not calculated for less than 10 data points.
95% UCL-N - 95% UCL of normal data
95% UCL-T - 95% UCL of log-transformed data

(1) Shapiro-Wilk W-Test indicates data are lognormally distributed.
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum detected concentration used for EPC.
(3) Shapiro-Wilk W-Test indicates data are normally distributed.
(4) Data are not lognormally distributed or normally distributed. Non-parametric method was used.

Table 3.8
Medium-specific exposure point summary
Ventron/Velsicol Site

Scenario Timeframe:	Current/Future
Medium:	Subsurface Soil
Exposure Medium:	Air
Exposure Point:	Developed Area Indoor Air derived from subsurface soil

							Reasonable Maximum Exposure			Central Tendency		
Chemical of Potential Concern	Units	Equilibrium Concentration (1)	95% UCL of Normal Data	Maximum detected value	Maximum Qualifier	EPC Units	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Benzene	ug/m^3	1.3E+01	NA	NA		ug/m^3	1.3E+01	NA	(1)	1.3E+01	NA	(1)
2-Methylnaphthalene[a]	ug/m^3	2.4E+01	NA	NA		ug/m^3	1.2E+00	NA	(1)	2.4E+01	NA	(1)

Note: EPC - exposure point concentration
NA - not applicable
UCL - upper confidence limit

(1) Equilibrium concentration estimated using the site UCL concentration through application of the Johnson and Ettinger Model. See text.

[a] Indoor air model estimate based on the site UCL for the undeveloped area due to limited data for 2-methylnaphthalene in the developed area. The UCL for the developed area was 1.1E+04 $\mu g/kg$, which would result in an air estimate of 2.4E+01 $\mu g/m^3$.

Table 3.9
Medium-specific exposure point summary
Ventron/Velsicol Site

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Air
Exposure Point:	Developed Area Indoor Air derived from groundwater

Chemical of Potential Concern	Units	Equilibrium Concentration (1)	95% UCL of Normal Data	Maximum detected value	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Acetone	ug/m^3	3.6E-02	NA	NA		ug/m^3	3.6E-02	NA	(1)	3.6E-02	NA	(1)
Benzene	ug/m^3	9.7E-02	NA	NA		ug/m^3	9.7E-02	NA	(1)	9.7E-02	NA	(1)
Chlorobenzene	ug/m^3	4.2E-02	NA	NA		ug/m^3	4.2E-02	NA	(1)	4.2E-02	NA	(1)
Chloroethane	ug/m^3	3.1E-01	NA	NA		ug/m^3	3.1E-01	NA	(1)	3.1E-01	NA	(1)
1,4-Dichlorobenzene	ug/m^3	1.3E-02	NA	NA		ug/m^3	1.3E-02	NA	(1)	1.3E-02	NA	(1)
1,2-Dichloroethene, isome	ug/m^3	8.7E-02	NA	NA		ug/m^3	8.7E-02	NA	(1)	8.7E-02	NA	(1)
4-Methyl-2-pentanone	ug/m^3	6.3E-03	NA	NA		ug/m^3	6.3E-03	NA	(1)	6.3E-03	NA	(1)
Toluene	ug/m^3	2.7E+00	NA	NA		ug/m^3	2.7E+00	NA	(1)	2.7E+00	NA	(1)
Xylenes	ug/m^3	3.2E-01	NA	NA		ug/m^3	3.2E-01	NA	(1)	3.2E-01	NA	(1)
2-Methylnaphthalene	ug/m^3	1.1E-03	NA	NA		ug/m^3	1.1E-03	NA	(1)	1.1E-03	NA	(1)
Naphthalene	ug/m^3	1.6E-02	NA	NA		ug/m^3	1.6E-02	NA	(1)	1.6E-02	NA	(1)

Note: EPC - exposure point concentration
NA - not applicable
UCL - upper confidence limit

(1) Equilibrium concentration estimated using the sitewide groundwater UCL concentration through application of the Johnson and Ettinger Model. See text.

Table 3.10
Medium-specific exposure point summary
Ventron/Velsicol Site

Scenario Timeframe:	Future
Medium:	Subsurface Soil
Exposure Medium:	Air
Exposure Point:	Undeveloped Area Indoor Air derived from subsurface soil

Chemical of Potential Concern	Units	Equilibrium Concentration (1)	95% UCL of Normal Data	Maximum detected value	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Carbazole	ug/m^3	6.1E-05	NA	NA		ug/m^3	6.1E-05	NA	(1)	6.1E-05	NA	(1)
Toluene	ug/m^3	2.6E+01	NA	NA		ug/m^3	2.6E+01	NA	(1)	2.6E+01	NA	(1)
Xylenes	ug/m^3	4.0E+01	NA	NA		ug/m^3	4.0E+01	NA	(1)	4.0E+01	NA	(1)
Benz[a]anthracene	ug/m^3	1.4E-03	NA	NA		ug/m^3	1.4E-03	NA	(1)	1.4E-03	NA	(1)
Benzo[a]pyrene	ug/m^3	1.2E-03	NA	NA		ug/m^3	1.2E-03	NA	(1)	1.2E-03	NA	(1)
Benzo[b]fluoranthene	ug/m^3	1.6E-03	NA	NA		ug/m^3	1.6E-03	NA	(1)	1.6E-03	NA	(1)
Benzo[ghi]perylene	ug/m^3	5.2E-04	NA	NA		ug/m^3	5.2E-04	NA	(1)	5.2E-04	NA	(1)
Benzo[k]fluoranthene	ug/m^3	4.6E-04	NA	NA		ug/m^3	4.6E-04	NA	(1)	4.6E-04	NA	(1)
Dibenz[a,h]anthracene	ug/m^3	1.6E-04	NA	NA		ug/m^3	1.6E-04	NA	(1)	1.6E-04	NA	(1)
Indeno[1,2,3-cd]pyrene	ug/m^3	5.4E-04	NA	NA		ug/m^3	5.4E-04	NA	(1)	5.4E-04	NA	(1)
2-Methylnaphthalene	ug/m^3	1.2E+00	NA	NA		ug/m^3	1.2E+00	NA	(1)	1.2E+00	NA	(1)
Naphthalene	ug/m^3	3.0E+00	NA	NA		ug/m^3	3.0E+00	NA	(1)	5.4E-04	NA	(1)

Note: EPC - exposure point concentration
NA - not applicable
UCL - upper confidence limit

(1) Equilibrium concentration estimated using the site UCL concentration through application of the Johnson and Ettinger Model. See text.

Table 3.11
Medium-specific exposure point summary
Ventron/Velsicol Site

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Air
Exposure Point:	Undeveloped Area Indoor Air derived from groundwater

Chemical of Potential Concern	Units	Equilibrium Concentration (1)	95% UCL of Normal Data	Maximum detected value	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Acetone	ug/m^3	3.6E-02	NA	NA		ug/m^3	3.6E-02	NA	(1)	3.6E-02	NA	(1)
Benzene	ug/m^3	9.7E-02	NA	NA		ug/m^3	9.7E-02	NA	(1)	9.7E-02	NA	(1)
Chlorobenzene	ug/m^3	4.2E-02	NA	NA		ug/m^3	4.2E-02	NA	(1)	4.2E-02	NA	(1)
Chloroethane	ug/m^3	3.1E-01	NA	NA		ug/m^3	3.1E-01	NA	(1)	3.1E-01	NA	(1)
1,4-Dichlorobenzene	ug/m^3	1.3E-02	NA	NA		ug/m^3	1.3E-02	NA	(1)	1.3E-02	NA	(1)
1,2-Dichloroethene, isomers	ug/m^3	8.7E-02	NA	NA		ug/m^3	8.7E-02	NA	(1)	8.7E-02	NA	(1)
4-Methyl-2-pentanone	ug/m^3	6.3E-03	NA	NA		ug/m^3	6.3E-03	NA	(1)	6.3E-03	NA	(1)
Toluene	ug/m^3	2.7E+00	NA	NA		ug/m^3	2.7E+00	NA	(1)	2.7E+00	NA	(1)
Xylenes	ug/m^3	3.2E-01	NA	NA		ug/m^3	3.2E-01	NA	(1)	3.2E-01	NA	(1)
2-Methylnaphthalene	ug/m^3	1.1E-03	NA	NA		ug/m^3	1.1E-03	NA	(1)	1.1E-03	NA	(1)
Naphthalene	ug/m^3	1.6E-02	NA	NA		ug/m^3	1.6E-02	NA	(1)	1.6E-02	NA	(1)

Note: EPC - exposure point concentration
NA - not applicable
UCL - upper confidence limit

(1) Equilibrium concentration estimated using the sitewide groundwater UCL concentration through application of the Johnson and Ettinger Model. See text.

Table 3.12
Medium-specific exposure point summary
Ventron/Velsicol Site

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Air
Exposure Point:	Indoor Air from Showering/bathing - adult exposure

Chemical of Potential Concern	Units	Equilibrium Concentration (1)	95% UCL of Normal Data	Maximum detected value	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Acetone	ug/m^3	2.9E+00	NA	NA		ug/m^3	2.9E+00	NA	(1)	1.3E-01	NA	(1)
Benzene	ug/m^3	5.6E-01	NA	NA		ug/m^3	5.6E-01	NA	(1)	2.4E-02	NA	(1)
Bis[2-ethylhexyl]phthalate	ug/m^3	1.8E-01	NA	NA		ug/m^3	1.8E-01	NA	(1)	7.5E-03	NA	(1)
Chlorobenzene	ug/m^3	1.9E-01	NA	NA		ug/m^3	1.9E-01	NA	(1)	8.0E-03	NA	(1)
Chloroethane	ug/m^3	2.3E-01	NA	NA		ug/m^3	2.3E-01	NA	(1)	9.8E-03	NA	(1)
1,4-Dichlorobenzene	ug/m^3	1.2E-01	NA	NA		ug/m^3	1.2E-01	NA	(1)	5.0E-03	NA	(1)
1,2-Dichloroethene, isomers	ug/m^3	3.5E-01	NA	NA		ug/m^3	3.5E-01	NA	(1)	1.5E-02	NA	(1)
4-Methyl-2-pentanone	ug/m^3	2.8E-01	NA	NA		ug/m^3	2.8E-01	NA	(1)	1.2E-02	NA	(1)
4-Methylphenol	ug/m^3	3.8E-01	NA	NA		ug/m^3	3.8E-01	NA	(1)	1.6E-02	NA	(1)
Toluene	ug/m^3	1.1E+00	NA	NA		ug/m^3	1.1E+00	NA	(1)	4.9E-02	NA	(1)
Xylenes	ug/m^3	1.7E+00	NA	NA		ug/m^3	1.7E+00	NA	(1)	7.3E-02	NA	(1)
2-Methylnaphthalene	ug/m^3	2.9E-02	NA	NA		ug/m^3	2.9E-02	NA	(1)	1.3E-03	NA	(1)
Naphthalene	ug/m^3	5.0E-01	NA	NA		ug/m^3	5.0E-01	NA	(1)	2.1E-02	NA	(1)

Note: EPC - exposure point concentration
NA - not applicable
UCL - upper confidence limit

(1) Equilibrium concentration estimated using the sitewide groundwater UCL concentration through application of the Andelman Model. See text.

Table 5.13
Medium-specific exposure point summary
Ventron/Velsicol Site

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Air
Exposure Point:	Indoor Air from Showering/bathing - child exposure

Chemical of Potential Concern	Units	Equilibrium Concentration (1)	95% UCL of Normal Data	Maximum detected value	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Acetone	ug/m^3	5.2E+00	NA	NA		ug/m^3	5.2E+00	NA	(1)	4.6E-01	NA	(1)
Benzene	ug/m^3	9.9E-01	NA	NA		ug/m^3	9.9E-01	NA	(1)	8.7E-02	NA	(1)
Bis[2-ethylhexyl]phthalate	ug/m^3	3.1E-01	NA	NA		ug/m^3	3.1E-01	NA	(1)	2.7E-02	NA	(1)
Chlorobenzene	ug/m^3	3.3E-01	NA	NA		ug/m^3	3.3E-01	NA	(1)	2.9E-02	NA	(1)
Chloroethane	ug/m^3	4.1E-01	NA	NA		ug/m^3	4.1E-01	NA	(1)	3.6E-02	NA	(1)
1,4-Dichlorobenzene	ug/m^3	2.1E-01	NA	NA		ug/m^3	2.1E-01	NA	(1)	1.8E-02	NA	(1)
1,2-Dichloroethene, isomers	ug/m^3	6.3E-01	NA	NA		ug/m^3	6.3E-01	NA	(1)	2.1E-02	NA	(1)
4-Methyl-2-pentanone	ug/m^3	4.9E-01	NA	NA		ug/m^3	4.9E-01	NA	(1)	4.3E-02	NA	(1)
4-Methylphenol	ug/m^3	6.8E-01	NA	NA		ug/m^3	6.8E-01	NA	(1)	5.9E-02	NA	(1)
Toluene	ug/m^3	2.0E+00	NA	NA		ug/m^3	2.0E+00	NA	(1)	1.8E-01	NA	(1)
Xylenes	ug/m^3	3.0E+00	NA	NA		ug/m^3	3.0E+00	NA	(1)	2.6E-01	NA	(1)
2-Methylnaphthalene	ug/m^3	5.2E-02	NA	NA		ug/m^3	5.2E-02	NA	(1)	4.6E-03	NA	(1)
Naphthalene	ug/m^3	8.9E-01	NA	NA		ug/m^3	8.9E-01	NA	(1)	7.8E-02	NA	(1)

Note: EPC - exposure point concentration
NA - not applicable
UCL - upper confidence limit

(1) Equilibrium concentration estimated using the sitewide groundwater UCL concentration through application of the Andelman Model. See text.

Table 4.1
Values used for daily intake calculations
Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Medium: Soil/sediment
Exposure Medium: Surface soil/sediment
Exposure Point: Undeveloped Area surface soil/sediment
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in sediment/soil	mg/kg	see Table 3 series	--	see Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	kg/mg	0.000001	--	0.000001	--	CS x CF x IR x FI x EF x ED / (BW x AT)
	IR	Ingestion rate	mg soil/day	100	U.S. EPA 1991	50	U.S. EPA 1991	
	FI	Fraction ingested	--	1	[a]	1	[a]	
	EF	Exposure frequency	days/year	132	NJDEP 2001	65	NJDEP 2001	
	ED	Exposure duration	years	30	U.S. EPA 1991	9	U.S. EPA 1991	
	BW	Body weight	kg	70	U.S. EPA 1997a	70	U.S. EPA 1997a	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	10,950	U.S. EPA 1989	3,285	U.S. EPA 1989	
Dermal	CS	Chemical concentration in sediment/soil	mg/kg	see Table 3 series	--	see Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	kg/mg	0.000001	--	0.000001	--	CS x CF x SA x AF x EF x ED x ABS
	SA	Skin surface area available for contact	cm^2/event	5,700	U.S. EPA 2001	5,700	U.S. EPA 2001	/ (BW x AT)
	AF	Sediment/soil-to-skin adherence factor	mg/cm^2	0.07	U.S. EPA 2001	0.01	U.S. EPA 2001	
	EF	Exposure frequency	days/year	132	NJDEP 2001	65	NJDEP 2001	
	ED	Exposure duration	years	30	U.S. EPA 1991	9	U.S. EPA 1991	
	BW	Body weight	kg	70	U.S. EPA 1997a	70	U.S. EPA 1997a	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	10,950	U.S. EPA 1989	3,285	U.S. EPA 1989	
	ABS	Dermal absorption factor - chemical specific						
		Dermal absorption factor - arsenic	unitless	0.03	U.S. EPA 2001	0.03	U.S. EPA 2001	
		Dermal absorption factor - cadmium	unitless	0.001	U.S. EPA 2001	0.001	U.S. EPA 2001	
		Dermal absorption factor - semivolatile organics	unitless	0.10	U.S. EPA 2001	0.10	U.S. EPA 2001	
		Dermal absorption factor - PAHs	unitless	0.13	U.S. EPA 2001	0.13	U.S. EPA 2001	
		Dermal absorption factor - PCBs	unitless	0.14	U.S. EPA 2001	0.14	U.S. EPA 2001	

Note: -- - not applicable
CT - central tendency
OU1 - Operable Unit 1
PCB - polychlorinated biphenyl
PAH - polycyclic aromatic hydrocarbons
RME - reasonable maximum exposure

[a] Based on best professional judgment.

Table 4.2
Values used for daily intake calculations
Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Medium: Soil/sediment
Exposure Medium: Surface soil/sediment
Exposure Point: Undeveloped Area surface soil/sediment
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent/Pre-Adolescent

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in sediment/soil	mg/kg	see Table 3 series	--	see Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	kg/mg	0.000001	--	0.000001	--	CS x CF x IR x FI x EF x ED / (BW x AT)
	IR	Ingestion rate	mg soil/day	100	U.S. EPA 1991	50	U.S. EPA 1991	
	FI	Fraction ingested	--	1	[a]	1	[a]	
	EF	Exposure frequency	days/year	132	NJDEP 2001	65	NJDEP 2001	
	ED	Exposure duration	years	9	[a]	9	[a]	
	BW	Body weight	kg	49	U.S. EPA 1997a	49	U.S. EPA 1997a	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	3,285	U.S. EPA 1989	3,285	U.S. EPA 1989	
Dermal	CS	Chemical concentration in sediment/soil	mg/kg	see Table 3 series	--	see Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	kg/mg	0.000001	--	0.000001	--	CS x CF x SA x AF x EF x ED x ABS
	SA	Skin surface area available for contact	cm^2/event	4,000	NJDEP 2001	4,000	NJDEP 2001	/ (BW x AT)
	AF	Sediment/soil-to-skin adherence factor	mg/cm^2	0.2	U.S. EPA 2001	0.04	U.S. EPA 2001	
	EF	Exposure frequency	days/year	132	NJDEP 2001	65	NJDEP 2001	
	ED	Exposure duration	years	9	[a]	9	[a]	
	BW	Body weight	kg	49	U.S. EPA 1997a	49	U.S. EPA 1997a	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	3,285	U.S. EPA 1989	3,285	U.S. EPA 1989	
	ABS	Dermal absorption factor - chemical specific						
		Dermal absorption factor - arsenic	unitless	0.03	U.S. EPA 2001	0.03	U.S. EPA 2001	
		Dermal absorption factor - cadmium	unitless	0.001	U.S. EPA 2001	0.001	U.S. EPA 2001	
		Dermal absorption factor - PAHs	unitless	0.13	U.S. EPA 2001	0.13	U.S. EPA 2001	
		Dermal absorption factor - PCBs	unitless	0.14	U.S. EPA 2001	0.14	U.S. EPA 2001	

Note: -- - not applicable
CT - central tendency
OU1 - Operable Unit 1
PCB - polychlorinated biphenyl
PAH - polycyclic aromatic hydrocarbons
RME - reasonable maximum exposure

[a] Based on best professional judgment.

Table 4.3
Values used for daily intake calculations
Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface soil
Exposure Point: Developed/Undeveloped Area surface soil
Receptor Population: Long-Term Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	see Table 3 series	--	see Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	kg/mg	0.000001	--	0.000001	--	CS x CF x IR x FI x EF x ED / (BW x AT)
	IR	Ingestion rate	mg soil/day	50	U.S. EPA 1991	50	U.S. EPA 1991	
	EF	Exposure frequency	days/year	250	U.S. EPA 1997a	250	U.S. EPA 1997a	
	ED	Exposure duration	years	25	U.S. EPA 1991	6.6	U.S. EPA 1997a	
	BW	Body weight	kg	70	U.S. EPA 1991	70	U.S. EPA 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	9,125	U.S. EPA 1989	2,409	U.S. EPA 1989	
Dermal	CS	Chemical concentration in soil	mg/kg	see Table 3 series	--	see Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	kg/mg	0.000001	--	0.000001	--	CS x CF x SA x AF x EF x ED x ABS
	SA	Skin surface area available for contact	cm^2/event	3,300	U.S. EPA 2001	3,300	U.S. EPA 2001	/ (BW x AT)
	AF	Soil-to-skin adherence factor	mg/cm^2	0.2	U.S. EPA 2001	0.02	U.S. EPA 2001	
	EF	Exposure frequency	days/year	250	U.S. EPA 1997a	250	U.S. EPA 1997a	
	ED	Exposure duration	years	25	U.S. EPA 1991	6.6	U.S. EPA 1991	
	BW	Body weight	kg	70	U.S. EPA 1991	70	U.S. EPA 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	9,125	U.S. EPA 1989	2,409	U.S. EPA 1989	
	ABS	Dermal absorption factor - chemical specific						
		Dermal absorption factor - arsenic	unitless	0.03	U.S. EPA 2001	0.03	U.S. EPA 2001	
		Dermal absorption factor - cadmium	unitless	0.001	U.S. EPA 2001	0.001	U.S. EPA 2001	
		Dermal absorption factor - PAHs	unitless	0.13	U.S. EPA 2001	0.13	U.S. EPA 2001	
		Dermal absorption factor - PCBs	unitless	0.14	U.S. EPA 2001	0.14	U.S. EPA 2001	

Note: -- - not applicable
CT - central tendency
OU1 - Operable Unit 1
PCB - polychlorinated biphenyl
PAH - polycyclic aromatic hydrocarbons
RME - reasonable maximum exposure

[a] Based on best professional judgment.

Table 4.4
Values used for daily intake calculations
Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Subsurface soil
Exposure Point: Developed and undeveloped areas subsurface soil (1-20 ft depths)
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration - subsurface soil	mg/kg	see Table 3 series	--	see Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	kg/mg	0.000001	--	0.000001	--	CS x CF x IR x FI x EF x ED / (BW x AT)
	IR	Ingestion rate	mg soil/day	330	U.S. EPA 1991	50	U.S. EPA 1991	
	FI	Fraction ingested	--	1	[a]	1	[a]	
	EF	Exposure frequency	days/year	60	NJDEP 2001	25	NJDEP 2001	
	ED	Exposure duration	years	2	[a]	2	[a]	
	BW	Body weight	kg	70	U.S. EPA 1991	70	U.S. EPA 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	730	U.S. EPA 1989	730	U.S. EPA 1989	
Dermal	CS	Chemical concentration in soil	mg/kg	see Table 3 series	--	see Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	kg/mg	0.000001	--	0.000001	--	CS x CF x SA x AF x EF x ED x ABS
	SA	Skin surface area available for contact	cm^2/event	3,300	U.S. EPA 2001	3,300	U.S. EPA 2001	/ (BW x AT)
	AF	Soil-to-skin adherence factor	mg/cm^2	0.2	U.S. EPA 2001	0.1	U.S. EPA 2001	
	EF	Exposure frequency	days/year	60	NJDEP 2001	25	NJDEP 2001	
	ED	Exposure duration	years	2	[a]	2	[a]	
	BW	Body weight	kg	70	U.S. EPA 1991	70	U.S. EPA 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	730	U.S. EPA 1989	730	U.S. EPA 1989	
	ABS	Dermal absorption factor - chemical specific						
		Dermal absorption factor - arsenic	unitless	0.03	U.S. EPA 2001	0.03	U.S. EPA 2001	
		Dermal absorption factor - cadmium	unitless	0.001	U.S. EPA 2001	0.001	U.S. EPA 2001	
		Dermal absorption factor - PAHs	unitless	0.13	U.S. EPA 2001	0.13	U.S. EPA 2001	
		Dermal absorption factor - PCBs	unitless	0.14	U.S. EPA 2001	0.14	U.S. EPA 2001	

Note: -- - not applicable
CT - central tendency
OU1 - Operable Unit 1
PCB - polychlorinated biphenyl
PAH - polycyclic aromatic hydrocarbons
RME - reasonable maximum exposure

[a] Based on best professional judgment.

Table 4.5
Values used for daily intake calculations
Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Medium: Surface water
Exposure Medium: Surface water
Exposure Point: Undeveloped Area surface water
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical concentration in surface water	mg/L	see Table 3 series	--	see Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	L/m^3	0.001	--	0.001	--	CW x CF x IR x EF x ED x ET / (BW x AT)
	IR	Ingestion rate	mL/hour	12	U.S. EPA 1991[a]	12	U.S. EPA 1991[a]	
	EF	Exposure frequency	days/year	132	NJDEP 2001	65	NJDEP 2001	
	ED	Exposure duration	years	30	U.S. EPA 1991	9	U.S. EPA 1991	
	ET	Exposure time	hours/event	1	U.S. EPA 1997a	0.5	[a]	
	BW	Body weight	kg	70	U.S. EPA 1991	70	U.S. EPA 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	10,950	U.S. EPA 1989	3,285	U.S. EPA 1989	
Dermal	CW	Chemical concentration in surface water	mg/L	see Table 3 series	--	see Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	L/m^3	0.001	--	0.001	--	CW x CF x SA x PC x EF x ED x ET
	SA	Skin surface area available for contact	cm^2 /event	5,700	U.S. EPA 2001	5,700	U.S. EPA 2001	/ (BW x AT)
	PC	Chem.-spec. dermal permeability constant	cm/hour	chem. spec.	U.S. EPA 1992b	chem. spec.	U.S. EPA 1992b	
	EF	Exposure frequency	days/year	132	NJDEP 2001	65	NJDEP 2001	
	ED	Exposure duration	years	30	U.S. EPA 1991	9	U.S. EPA 1991	
	ET	Exposure time	hrs/day	1	U.S. EPA 1997a	0.5	[a]	
	BW	Body weight	kg	70	U.S. EPA 1997a	70	U.S. EPA 1997a	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	10,950	U.S. EPA 1989	3,285	U.S. EPA 1989	

Note: -- - not applicable
CT - central tendency
OU1 - Operable Unit 1
RME - reasonable maximum exposure

[a] Based on best professional judgment.

Table 4.6
Values used for daily intake calculations
Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Medium: Surface water
Exposure Medium: Surface water
Exposure Point: Undeveloped Area surface water
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent/Pre-Adolescent

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical concentration in surface water	mg/L	see Table 3 series	--	see Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	L/m^3	0.001	--	0.001	--	CW x CF x IR x EF x ED x ET / (BW x AT)
	IR	Ingestion rate	mL/hour	12	U.S. EPA 1991[a]	12	U.S. EPA 1991[a]	
	EF	Exposure frequency	days/year	132	NJDEP 2001	65	NJDEP 2001	
	ED	Exposure duration	years	9	[a]	9	[a]	
	ET	Exposure time	hours/event	1	U.S. EPA 1997a	0.5	[a]	
	BW	Body weight	kg	49	U.S. EPA 1997a	49	U.S. EPA 1997a	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	3,285	U.S. EPA 1989	3,285	U.S. EPA 1989	
Dermal	CW	Chemical concentration in surface water	mg/L	see Table 3 series	--	see Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	L/m^3	0.001	--	0.001	--	CW x CF x SA x PC x EF x ED x ET
	SA	Skin surface area available for contact	cm^2 /event	4,000	U.S. EPA 2001c	4,000	U.S. EPA 2001c	/ (BW x AT)
	PC	Chem.-spec. dermal permeability constant	cm/hour	chem. spec.	U.S. EPA 1992	chem. spec.	U.S. EPA 1992	
	EF	Exposure frequency	days/year	132	NJDEP 2001	65	NJDEP 2001	
	ED	Exposure duration	years	9	[a]	9	[a]	
	ET	Exposure time	hours/day	1	U.S. EPA 1997a	0.5	[a]	
	BW	Body weight	kg	49	U.S. EPA 1997a	49	U.S. EPA 1997a	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	3,285	U.S. EPA 1989	3,285	U.S. EPA 1989	

Note: -- - not applicable
CT - central tendency
OU1 - Operable Unit 1
PCB - polychlorinated biphenyl
RME - reasonable maximum exposure

[a] Based on best professional judgment. Refer to supporting information in text.

Table 4-7. Summary of factors used to assess dermal exposure to water

Chemical of Concern	Dermal Permeability Constants[a] (cm/hour)
Inorganics	
Arsenic	0.001
Barium	0.001
Cadmium	
Soil	NA
Water	0.001
Chromium (as chromium(VI))	0.002
Iron	0.001
Manganese	0.001
Mercury	0.001
Methyl mercury	--
Nickel	0.0001[b]
Thallium (as thallium chloride)	0.001
Vanadium	0.001
Organics	
Acetone	0.0014
Benzene	0.021[b]
Chloroethane	0.008[b]
Chlorobenzene	0.041[b]
1,4-Dichlorobenzene	0.062[b]
1,2-Dichloroethene, isomers	0.0013[b]
Ethylbenzene	0.049
4-Methyl-2-pentanone (MIBK)	0.000036
4-Methylphenol (as phenol)	0.0043
Toluene	0.045[b]
Xylene isomers (total)	0.08[b]
PAHs	
2-Methylnaphthalene (as napthalene)	0.069[b]
Napthalene	0.069[b]

Note: -- - no data available for these chemicals

[a] Dermal absorption factors, oral to dermal adjustment factors, and permeability constants from U.S. EPA (2001) unless otherwise noted.

[b] Dermal permeability factor provided by NJDEP and EPA (NJDEP 2001).

Table 4.8
Values used for daily intake calculations
Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater sitewide
Receptor Population: Long-term Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical concentration in water	mg/L	see Table 3 series	--	see Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR	Ingestion rate	L/day	1	U.S. EPA 1997a	0.7	U.S. EPA 1997a	CW x IR x EF x ED / (BW x AT)
	FI	Fraction ingested	--	1	[a]	1	[a]	
	EF	Exposure frequency	days/year	250	U.S. EPA 1991	250	U.S. EPA 1991	
	ED	Exposure duration	years	25	U.S. EPA 1991	6.6	U.S. EPA 1997a	
	BW	Body weight	kg	70	U.S. EPA 1991	70	U.S. EPA 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	9,125	U.S. EPA 1989	2,409	U.S. EPA 1989	
Dermal	CW	Chemical concentration in water	mg/L	Table 3 series	--	Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	SA	Skin surface area available for contact	cm^2/event	977	U.S. EPA 1997a	793	U.S. EPA 1997a	CW x CF x SA x PC x EF x ED x ET
	PC	Chem.-spec. dermal permeability constant	cm/hour	chem. spec.	U.S. EPA 1992b	chem. spec.	U.S. EPA 1992b	/ (BW x AT)
	EF	Exposure frequency	days/year	250	U.S. EPA 1991	250	U.S. EPA 1991	
	ED	Exposure duration	years	25	U.S. EPA 1991	6.6	U.S. EPA 1997a	
	ET	Exposure time	hours/day	0.03	[a]	0.03	[a]	
	BW	Body weight	kg	70	U.S. EPA 1991	70	U.S. EPA 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	9,125	U.S. EPA 1989	2,409	U.S. EPA 1989	

Note: -- - not applicable
CT - central tendency
OU1 - Operable Unit 1
RME - reasonable maximum exposure

Dermal surface areas represent values for hands only and were derived from the average of values for men and women. RME values are maximum, and central tendency values for hand surface areas are means, from U.S. EPA (1997a, Table 6-4).

Exposure time relates to washing hands. CT value for ingestion rate is mean of 1.4 L from U.S. EPA (1997a) assuming half is consumed at work.

[a] Based on best professional judgment.

Table 4.9
Values used for daily intake calculations
Ventron Velsicol Site

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater sitewide
Receptor Population: Future Hypothetical Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical concentration in water	mg/L	see Table 3 series	--	see Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR	Ingestion rate	L/day	2	U.S. EPA 1991	1.4	U.S. EPA 1997a	CW x IR x EF x ED / (BW x AT)
	FI	Fraction ingested	--	1	[a]	1	[a]	
	EF	Exposure frequency	days/year	350	U.S. EPA 2001	350	U.S. EPA 2001	
	ED	Exposure duration	years	30	U.S. EPA 2001	9	U.S. EPA 2001	
	BW	Body weight	kg	70	U.S. EPA 2001	70	U.S. EPA 2001	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	10,950	U.S. EPA 1989	3,285	U.S. EPA 1989	
Dermal	CW	Chemical concentration in water	mg/L	Table 3 series	--	Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	SA	Skin surface area available for contact	cm^2/event	18,000	U.S. EPA 1997a	18,000	U.S. EPA 1997a	CW x CF x SA x PC x EF x ED x ET x EV
	PC	Chem.-spec. dermal permeability constant	cm/hour	chem. spec.	U.S. EPA 1992b	chem. spec.	U.S. EPA 1992b	/ (BW x AT)
	EF	Exposure frequency	days/year	350	U.S. EPA 2001	350	U.S. EPA 2001	
	ED	Exposure duration	years	30	U.S. EPA 2001	9	U.S. EPA 2001	
	EV	Event frequency	days/year	0.25	U.S. EPA 2001	0.1	U.S. EPA 2001	
	ET	Exposure time	hours/day	0.25	U.S. EPA 2003d	0.10	U.S. EPA 2003d	
	BW	Body weight	kg	70	U.S. EPA 2001	70	U.S. EPA 2001	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	10,950	U.S. EPA 1989	3,285	U.S. EPA 1989	

Note: -- - not applicable
CT - central tendency
OU1 - Operable Unit 1
RME - reasonable maximum exposure

Central tendency ingestion rate is a mean from U.S. EPA (1997c, Table 3-30).

[a] Based on best professional judgment.

Table 4.10
Values used for daily intake calculations
Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater sitewide
Receptor Population: Future Hypothetical Resident
Receptor Age: Young Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical concentration in water	mg/L	see Table 3 series	--	see Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR	Ingestion rate	L/day	1.5	U.S. EPA 1997a	0.74	U.S. EPA 1997a	CW x IR x EF x ED / (BW x AT)
	FI	Fraction ingested	--	1	[a]	1	[a]	
	EF	Exposure frequency	days/year	350	U.S. EPA 2001	350	U.S. EPA 2001	
	ED	Exposure duration	years	6	U.S. EPA 2001	6	U.S. EPA 2001	
	BW	Body weight	kg	15	U.S. EPA 2001	15	U.S. EPA 2001	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	2,190	U.S. EPA 1989	2,190	U.S. EPA 1989	
Dermal	CW	Chemical concentration in water	mg/L	Table 3 series	--	Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	SA	Skin surface area available for contact	cm^2/event	6,600	U.S. EPA 1997a	6,600	U.S. EPA 1997a	CW x CF x SA x PC x EF x ED x ET
	PC	Chem.-spec. dermal permeability constant	cm/hour	chem. spec.	U.S. EPA 1992b	chem. spec.	U.S. EPA 1992b	/ (BW x AT)
	EF	Exposure frequency	days/year	350	U.S. EPA 2001	350	U.S. EPA 2001	
	ED	Exposure duration	years	6	U.S. EPA 2001	6	U.S. EPA 2001	
	ET	Exposure time	hours/day	0.45	U.S. EPA 2003d	0.10	U.S. EPA 2003d	
	BW	Body weight	kg	15	U.S. EPA 2001	15	U.S. EPA 2001	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	2,190	U.S. EPA 1989	2,190	U.S. EPA 1989	

Note: -- - not applicable
CT - central tendency
OU1 - Operable Unit 1
RME - reasonable maximum exposure

Central tendency ingestion rate is a mean from U.S. EPA (1997, Table 3-30) and represents the average of mean intakes of children less than 3 years and children 3 to 5 years.

[a] Based on best professional judgment.

Table 4.11
Values used for daily intake calculations
Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Air
Exposure Point: Outdoor air
Receptor Population: Long-term Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CA	Chemical concentration in air	mg/m^3	see Table 3 series	--	see Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	--	1	--	1	--	CA x CF x IR x EF x ED / (BW x AT)
	IR	Inhalation rate	m^3/day	6.6[a]	U.S. EPA 1997a	2.6[b]	U.S. EPA 1997a	
	EF	Exposure frequency	days/year	250	U.S. EPA 1991	250	U.S. EPA 1991	
	ED	Exposure duration	years	25	U.S. EPA 1991	6.6	U.S. EPA 1997a	
	BW	Body weight	kg	70	U.S. EPA 1991	70	U.S. EPA 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	9,125	U.S. EPA 1989	2,409	U.S. EPA 1989	

Note: -- - not applicable
CT - central tendency
OU1 - Operable Unit 1
RME - reasonable maximum exposure

[a] Represents two hours of outdoor work at the upper percentile inhalation rate of 3.3 m^3/hour.

[b] Represents two hours of outdoor work at the average inhalation rate of 1.3 m^3/hour.

Table 4.12
Values used for daily intake calculations
Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Medium: Groundwater and subsurface soil
Exposure Medium: Air
Exposure Point: Indoor air via vapor intrusion
Receptor Population: Long-Term Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CA	Chemical concentration in air	mg/m^3	see Table 3 series	--	see Table 3 series	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	--	1	--	1	--	CA x CF x IR x EF x ED / (BW x AT)
	IR	Inhalation rate[a]	m^3/day	12	U.S. EPA 1997a	9	U.S. EPA 1997a	
	EF	Exposure frequency	days/year	250	U.S. EPA 1991	250	U.S. EPA 1991	
	ED	Exposure duration	years	25	U.S. EPA 1991	6.6	U.S. EPA 1997a	
	BW	Body weight	kg	70	U.S. EPA 1991	70	U.S. EPA 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA 1989	25,550	U.S. EPA 1989	
	AT-NC	Averaging Time (Noncancer)	days	9,125	U.S. EPA 1989	2,409	U.S. EPA 1989	

Note: -- - not applicable
CT - central tendency
OU1 - Operable Unit 1
RME - reasonable maximum exposure

[a] The inhalation rate for CT was calculated using a rate of 1.0 m^3/hour for 9 hours and the RME estimate was calculated assuming 5 hours at a moderate inhalation rate of 1.6 and 4 hours at a light inhalation rate of 1.0 m^3/hour (U.S. EPA 1997, Table 5-23).

Table 5.1
Non-cancer toxicity data -- oral/dermal
Ventron/Velsicol Site

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor[a]	Adjusted Dermal RfD[b]	Units	Primary Target Organ or System	Combined Uncertainty/ Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ[c], (MM/DD/YY)
Inorganic Analytes										
Aluminum	Chronic	1	mg/kg-day	--	1	mg/kg-day	--	--	NCEA[d]	NA
Antimony	Chronic	0.0004	mg/kg-day	0.15	0.00006	mg/kg-day	Longevity; metabolic	1000/1	IRIS	9/22/03
Arsenic	Chronic	0.0003	mg/kg-day	0.95	0.0003	mg/kg-day	Skin/vascular	3/1	IRIS	9/22/03
Barium	Chronic	0.07	mg/kg-day	0.07	0.0049	mg/kg-day	None reported (kidney)	3/1	IRIS	9/22/03
Cadmium (water)[e]	Chronic	0.005[e]	mg/kg-day	0.025	0.000125	mg/kg-day	Kidney	10/1	IRIS	9/22/03
Cadmium (food, soil, sediment)	Chronic	0.01	mg/kg-day	0.05	0.0005	mg/kg-day	Kidney	10/1	IRIS	9/22/03
Chromium (as Chromium VI)[f]	Chronic	0.003[f]	mg/kg-day	0.025	0.000075	mg/kg-day	None reported	300/3	IRIS	9/22/03
Copper	Chronic	0.037	mg/kg-day	--	0.0004	mg/kg-day	--	--	HEAST[d]	NA
Iron	Chronic	0.3	mg/kg-day	--	0.003	mg/kg-day	--	--	NCEA[d]	NA
Lead	Chronic	NA	mg/kg-day	NA	NA	mg/kg-day	NA	NA	NA	NA
Manganese	Chronic	0.047	mg/kg-day	0.04	0.0019	mg/kg-day	Central nervous	1/3	IRIS	9/22/03
Mercury (as mercuric chloride)	Chronic	0.0003	mg/kg-day	0.07	0.000021	mg/kg-day	Immunologic	1,000/1	IRIS	9/22/03
Methylmercury	Chronic	0.0001	mg/kg-day	0.95	0.0001	mg/kg-day	Neurologic	10/1	IRIS	9/22/03
Nickel (soluble salts)	Chronic	0.02	mg/kg-day	0.04	0.0008	mg/kg-day	Decreased body and organ weights	300/1	IRIS	9/22/03
Selenium	Chronic	0.005	mg/kg-day	0.8	0.005	mg/kg-day	Selenosis: liver, CNS, skin	3/1	IRIS	9/22/03
Silver	Chronic	0.005	mg/kg-day	0.04	0.0002	mg/kg-day	Skin (argyria)	3/1	IRIS	9/22/03
Thallium (as thallium chloride)	Chronic	0.00008	mg/kg-day	1	0.00008	mg/kg-day	Liver enzymes	3000/1	IRIS	9/22/03
Vanadium (as vanadium pentoxide)	Chronic	0.009	mg/kg-day	0.026	0.00023	mg/kg-day	Hematopoietic	100/1	IRIS	9/22/03
Zinc	Chronic	0.3	mg/kg-day	--	0.003	mg/kg-day	Blood	3/1	IRIS	1/8/2002
Organic Analytes										
Acetone	Chronic	0.90	mg/kg-day	1	0.90	mg/kg-day	Kidney	1000/1	IRIS	9/22/03
Benzene	Chronic	0.004	mg/kg-day	1	0.004	mg/kg-day	Hematopoietic	300/1	IRIS	9/22/03
bis[2-ethylhexyl]phthalate	Chronic	0.02	mg/kg-day	1	0.02	mg/kg-day	Increased liver weight	1000/1	IRIS	9/22/03
Chlorobenzene	Chronic	0.02	mg/kg-day	1	0.02	mg/kg-day	Liver	1000/1	IRIS	9/22/03
Chloroethane	Chronic	0.4	mg/kg-day	0.9	0.4	mg/kg-day	--	--	NCEA[d]	NA
1,4-Dichlorobenzene	Chronic	0.03	mg/kg-day	1	0.03	mg/kg-day	--	--	NCEA[d]	NA
1,2-Dichloroethene, isomers (as trans 1,2-dichloroethylene)	Chronic	0.02	mg/kg-day	1	0.02	mg/kg-day	Serum enzymes	1000/1	IRIS	9/22/03

Table 5.1
Non-cancer toxicity data -- oral/dermal
Ventron/Velsicol Site

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor[a]	Adjusted Dermal RfD[b] (mg/kg-day)	Units	Primary Target Organ or System	Combined Uncertainty/ Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ[c], (MM/DD/YY)
4-Methyl-2-pentanone	Chronic	0.08	mg/kg-day	1	0.08	mg/kg-day	--	--	HEAST[d]	NA
4-Methylphenol	Chronic	0.005	mg/kg-day	1	0.005	mg/kg-day	--	--	HEAST[d]	NA
Toluene	Chronic	0.2	mg/kg-day	1	0.2	mg/kg-day	Liver and kidney weight	1000/1	IRIS	9/22/03
Xylene isomers (total)	Chronic	0.2	mg/kg-day	1	0.2	mg/kg-day	Hyperactivity, body weight, mortality	1000/1	IRIS	9/22/03
PAHs										
Benzo[g,h,i]perylene (as naphthalene)[g]	--	0.02	mg/kg-day	1	0.02	mg/kg-day	--	--	--[g]	--
2-Methylnaphthalene[g] (as naphthalene)	--	0.02	mg/kg-day	1	0.02	mg/kg-day	--	--	--[g]	--
Naphthalene	Chronic	0.02	mg/kg-day	1	0.02	mg/kg-day	Body weight	3000/1	IRIS	9/22/03
PCBs										
Aroclor® 1254	Chronic	0.00002	mg/kg-day	1	0.00002	mg/kg-day	Immunologic	300/1	IRIS	9/22/03

Note: -- - not available
EPA - U.S. Environmental Protection Agency
IRIS - Integrated Risk Information System
NA - not applicable
NCEA - National Center for Environmental Assessment
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
RfD - reference dose

[a] Dermal adjustment factors from Exhibit 4-1 in U.S. EPA (2001).

[b] Consistent with U.S. EPA (2001), where oral absorption is less than 50 percent, oral RfDs are adjusted by multiplying by the oral to dermal adjustment factor.

[c] Date represents: IRIS - date is when IRIS was searched; HEAST - Publication date; NCEA - article date.

[d] Source as cited by U.S. EPA Region IX (U.S. EPA 2003a).

[e] RfDs are available for cadmium in food or water.

[f] Because the chemical forms of chromium present are not known, the human health risk assessment conservatively assumes that all chromium is present as chromium(VI).

[g] Toxicity data for naphthalene applied in the absence of an approved EPA value.

Table 5.2
Non-cancer toxicity data -- inhalation
Ventron/Velsicol Site

Chemical of Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Adjusted Inhalation RfDi	Units	Primary Target Organ or System	Combined Uncertainty/ Modifying Factors	Sources of RfC:RfD: Target Organ	Dates of RfD: Target Organ[a], (MM/DD/YY)
Inorganic Analytes									
Mercury vapor[b]	Chronic	0.0003	mg/m^3	0.000086	mg/kg-day	Central nervous system	30/1	IRIS	9/22/03
Organic Analytes									
Acetone	Chronic	0.35	mg/m^3	0.1	mg/kg-day	--	--	r[c]	NA
Benzene	Chronic	0.03	mg/m^3	0.0086	mg/kg-day	Hematopoietic	300/1	IRIS	9/22/03
bis[2-ethylhexyl]phthalate	Chronic	0.077	mg/m^3	0.022	mg/kg-day	--	--	r[c]	NA
Chlorobenzene	Chronic	0.06	mg/m^3	0.017	mg/kg-day	--	--	NCEA[c]	NA
Chloroethane	Chronic	10	mg/m^3	2.9	mg/kg-day	--	--	EPA Region IX	NA
1,4-Dichlorobenzene	Chronic	0.8	mg/m^3	0.23	mg/kg-day	Increased liver weight	100/1	IRIS	9/22/03
1,2-Dichloroethene, isomers (as trans 1,2-dichloroethylene)	Chronic	0.07	mg/m^3	0.020	mg/kg-day	--		r[c]	NA
4-Methyl-2-pentanone	Chronic	0.08	mg/m^3	0.023	mg/kg-day	--		r[c]	NA
4-Methylphenol	Chronic	0.018	mg/m^3	0.005	mg/kg-day	--		r[c]	NA
Toluene	Chronic	0.4	mg/m^3	0.11	mg/kg-day	Neurological effects	300/1	IRIS	9/22/03
Xylene isomers (total)	Chronic	0.1	mg/m^3	0.029	mg/kg-day	Central nervous system	300/1	IRIS	9/22/03
PAHs									
Benzo[g,h,i]perylene (as naphthalene)	--	0.003	mg/m^3	0.00086	mg/kg-day	--	--	--[d]	NA
2-Methylnaphthalene[d] (as naphthalene)	--	0.003	mg/m^3	0.00086	mg/kg-day	--	--	--[d]	NA
Naphthalene	Chronic	0.003	mg/m^3	0.00086	mg/kg-day	Nasal effects; hyperplasia	3000/1	IRIS	9/22/03

Note: -- - not available
EPA - U.S. Environmental Protection Agency
IRIS - Integrated Risk Information System
NA - not applicable
NCEA - National Center for Environmental Assessment
PAH - polycyclic aromatic hydrocarbon
r - route extrapolation
RfC - reference concentration
RfD - reference dose

Adjustment factor applied to RfC to calculate RfD = 1/70 kg × 20 m^3/day. Adjustment factor applied to RfD to calculate RfC = 70 kg × 1/20 m^3/day.

[a] Date represents: IRIS - date is when IRIS was searched; HEAST - Publication date; NCEA - article date.

[b] This is a reference concentration for elemental mercury to be used for vapor inhalation only. There is no RfD for elemental mercury.

[c] Source as cited by U.S. EPA Region IX (U.S. EPA 2003a).

[d] Toxicity data for naphthalene applied in the absence of an approved EPA value.

Table 6.1
Cancer toxicity data – oral/dermal
Ventron/Velsicol Site

Contaminant of Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor[a]	Adjusted Dermal Cancer Slope Factor[a]	Units	Weight-of-Evidence/ Cancer Guideline Description[b]	Source of CSF	Date of CSF Source[c] (MM/DD/YY)
Inorganic Analytes							
Arsenic	1.5	95%	1.5	$(mg/kg\text{-}day)^{-1}$	A	IRIS	9/22/03
Organic Analytes							
Benzene	0.055	100%	0.055	$(mg/kg\text{-}day)^{-1}$	A	IRIS[d]	9/22/03
bis[2-ethylhexyl]phthalate	0.014	100%	0.014	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	9/22/03
Carbazole	0.02	100%	0.02	$(mg/kg\text{-}day)^{-1}$	B2	HEAST	07/31/97
Chloroethane	0.0029	90%	0.0029	$(mg/kg\text{-}day)^{-1}$	B2	NCEA[d]	07/12/99
1,4-Dichlorobenzene	0.024	100%	0.024	$(mg/kg\text{-}day)^{-1}$	C	HEAST	07/31/97
PAHs[e]							
Benz[a]anthracene	0.73	100%	0.73	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/09/02
Benzo[a]pyrene	7.3	100%	7.3	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/09/02
Benzo[b]fluoranthene	0.73	100%	0.73	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/09/02
Benzo[k]fluoranthene	0.073	100%	0.073	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/09/02
Dibenz[a,h]anthracene	7.3	100%	7.3	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/09/02
Indeno[1,2,3-cd]pyrene	0.73	100%	0.73	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/09/02
PCBs	2	100%	2	$(mg/kg\text{-}day)^{-1}$	B2	IRIS[d]	01/09/02

Note: Toxicity values obtained from U.S. EPA (2003b), unless otherwise specified.

CSF - carcinogenic slope factor
EPA - U.S. Environmental Protection Agency
HEAST - Health Effects Assessment Summary Tables
IRIS - Integrated Risk Information System
NCEA - National Center for Environmental Assessment
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl

[a] Consistent with U.S. EPA (2001d), where oral absorption is less than 50 percent, oral reference doses are adjusted by multiplying by the oral to dermal adjustment factor. Dermal adjustment factors from Exhibit 4-1 of U.S. EPA (2001d).

[b] EPA group:
A - human carcinogen
B2 - probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - possible human carcinogen.

[c] Date represents: IRIS - date is when IRIS was searched; HEAST - Publication date; NCEA - article date.

[d] Carcinogenic slope factor as cited by U.S. EPA Region IX (U.S. EPA 2003a).

[e] Carcinogenic slope factors for PAH compounds are based on potency relative to benzo[a]pyrene per EPA guidance (U.S. EPA 2003a).

Table 6.2
Cancer toxicity data -- Inhalation
Ventron/Velsicol Site

Contaminant of Concern	Unit Risk	Units	Adjustment[a]	Inhalation Cancer Slope Factor	Units	Weight-of-Evidence/ Cancer Guideline Description[b]	Source	Date[c] (MM/DD/YY)
Organic Analytes								
Benzene	7.8E-06	$(\mu g/m^3)^{-1}$	3500	0.0273	$(mg/kg\text{-}day)^{-1}$	A	IRIS	9/22/03
bis[2-ethylhexyl]phthalate	4.0E-06	$(\mu g/m^3)^{-1}$	3500	0.014	$(mg/kg\text{-}day)^{-1}$	--	r[d]	NA
Carbazole	5.7E-06	$(\mu g/m^3)^{-1}$	3500	0.020	$(mg/kg\text{-}day)^{-1}$	--	r[d]	NA
Chloroethane	8.3E-07	$(\mu g/m^3)^{-1}$	3500	0.0029	$(mg/kg\text{-}day)^{-1}$	--	r[d]	NA
1,4-Dichlorobenzene	6.3E-06	$(\mu g/m^3)^{-1}$	3500	0.022	$(mg/kg\text{-}day)^{-1}$	--	NCEA[d]	NA
PAHs[e]		$(\mu g/m^3)^{-1}$				--		
Benz[a]anthracene	2.1E-04	$(\mu g/m^3)^{-1}$	3500	0.73	$(mg/kg\text{-}day)^{-1}$	--	r[d]	NA
Benzo[a]pyrene	2.1E-03	$(\mu g/m^3)^{-1}$	3500	7.3	$(mg/kg\text{-}day)^{-1}$	--	r[d]	NA
Benzo[b]fluoranthene	2.1E-04	$(\mu g/m^3)^{-1}$	3500	0.73	$(mg/kg\text{-}day)^{-1}$	--	r[d]	NA
Benzo[k]fluoranthene	2.1E-05	$(\mu g/m^3)^{-1}$	3500	0.073	$(mg/kg\text{-}day)^{-1}$	--	r[d]	NA
Dibenz[a,h]anthracene	2.1E-03	$(\mu g/m^3)^{-1}$	3500	7.3	$(mg/kg\text{-}day)^{-1}$	--	r[d]	NA
Indeno[1,2,3-cd]pyrene	2.09E-04	$(\mu g/m^3)^{-1}$	3500	0.73	$(mg/kg\text{-}day)^{-1}$	--	r[d]	NA

Note: Toxicity values obtained from U.S. EPA (2003b), unless otherwise specified.
- CSF - carcinogenic slope factor
- EPA - U.S. Environmental Protection Agency
- HEAST - Health Effects Assessment Summary Tables
- IRIS - Integrated Risk Information System
- NCEA - National Center for Environmental Assessment
- PAH - polycyclic aromatic hydrocarbon

[a] Adjustment factor applied to Unit Risk to calculate Inhalation Slope Factor = 70 kg×1/20m^3/day×1,000 μg/mg.
Adjustment factor applied to Inhalation Slope Factor to calculate Unit Risk = 20m^3/day x 1/ 70kg x 1/1000 μg/mg.

[b] EPA group:
- A - human carcinogen
- B2 - probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
- C - possible human carcinogen.

[c] Date represents: IRIS - date is when IRIS was searched; HEAST - Publication date; NCEA - article date.

[d] Carcinogenic slope factor as cited by U.S. EPA Region IX (U.S. EPA 2003a).

[e] Carcinogenic slope factors for PAH compounds are based on potency relative to benzo[a]pyrene per EPA guidance (U.S. EPA 2003a).

Scenario Timeframe: Current/Future
Medium: Air
Exposure Medium: Air
Exposure Point: Outdoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.1.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[b]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	**Metals and Organometallic Analytes**													
	Mercury vapor	3.3E-5	mg/m^3	--	3.3E-5	mg/m^3	M	2.1E-6	mg/kg-day	8.6E-5	mg/kg-day	--	--	0.025
	(Total)													0.025
													Total Hazard Index Across All Exposure Routes/Pathways:	0.025

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b]Represents inhalation reference dose for mercury vapor obtained from the inhalation RfC from EPA Integrated Risk Information System (IRIS) (January 2003b).

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Developed Area Indoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.2.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[b]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	**Organic Analytes**													
	Benzene	1.3E-2	mg/m^3	--	1.3E-2	mg/m^3	M	1.5E-3	mg/kg-day	8.6E-3	mg/kg-day	--	--	0.17
	PAHs													
	2-Methylnaphthalene	1.2E-3	mg/m^3	--	1.2E-3	mg/m^3	M	1.4E-4	mg/kg-day	8.6E-4	mg/kg-day	--	--	0.16
	(Total)													0.33
													Total Hazard Index Across All Exposure Routes/Pathways:	0.33

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Johnson and Ettinger Model and site subsurface soil data.

[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Developed Area Indoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.3.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[b]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	**Organic Analytes**													
	Acetone	3.6E-5	mg/m^3	--	3.6E-5	mg/m^3	M	4.3E-6	mg/kg-day	1.0E-1	mg/kg-day	--	--	0.000043
	Benzene	9.7E-5	mg/m^3	--	9.7E-5	mg/m^3	M	1.1E-5	mg/kg-day	8.6E-3	mg/kg-day	--	--	0.0013
	Chlorobenzene	4.2E-5	mg/m^3	--	4.2E-5	mg/m^3	M	5.0E-6	mg/kg-day	1.7E-2	mg/kg-day	--	--	0.00029
	Chloroethane	3.1E-4	mg/m^3	--	3.1E-4	mg/m^3	M	3.6E-5	mg/kg-day	2.9E+0	mg/kg-day	--	--	0.000012
	1,4-Dichlorobenzene	1.3E-5	mg/m^3	--	1.3E-5	mg/m^3	M	1.5E-6	mg/kg-day	2.3E-1	mg/kg-day	--	--	0.0000067
	1,2-Dichloroethene, isomers	8.7E-5	mg/m^3	--	8.7E-5	mg/m^3	M	1.0E-5	mg/kg-day	2.0E-2	mg/kg-day	--	--	0.00051
	4-Methyl-2-pentanone	6.3E-6	mg/m^3	--	6.3E-6	mg/m^3	M	7.4E-7	mg/kg-day	2.3E-2	mg/kg-day	--	--	0.000033
	Toluene	2.7E-3	mg/m^3	--	2.7E-3	mg/m^3	M	3.2E-4	mg/kg-day	1.1E-1	mg/kg-day	--	--	0.0029
	Xylenes	3.2E-4	mg/m^3	--	3.2E-4	mg/m^3	M	3.7E-5	mg/kg-day	2.9E-2	mg/kg-day	--	--	0.0013
	PAHs													
	Naphthalene	1.6E-5	mg/m^3	--	1.6E-5	mg/m^3	M	1.9E-6	mg/kg-day	8.6E-4	mg/kg-day	--	--	0.0022
	2-Methylnapthalene	1.1E-6	mg/m^3	--	1.1E-6	mg/m^3	M	1.3E-7	mg/kg-day	8.6E-4	mg/kg-day	--	--	0.00015
	(Total)													0.0088
													Total Hazard Index Across All Exposure Routes/Pathways:	0.0088

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Johnson and Ettinger Model and site subsurface soil data.

[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Undeveloped Area Indoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.4.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[b]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	**Organic Analytes**													
	Carbazole	6.1E-8	mg/m^3	--	6.1E-8	mg/m^3	M	--	--	ND	--	--	--	--
	Toluene	2.6E-2	mg/m^3	--	2.6E-2	mg/m^3	M	3.1E-3	mg/kg-day	1.1E-1	mg/kg-day	--	--	0.027
	Xylenes	4.0E-2	mg/m^3		4.0E-2	mg/m^3	M	4.7E-3	mg/kg-day	2.9E-2	mg/kg-day	--	--	0.17
	PAHs													
	Benz[a]anthracene	1.4E-6	mg/m^3	--	1.4E-6	mg/m^3	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	1.2E-6	mg/m^3	--	1.2E-6	mg/m^3	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	1.6E-6	mg/m^3	--	1.6E-6	mg/m^3	M	--	--	ND	--	--	--	--
	Benzo[ghi]perylene	5.2E-7	mg/m^3	--	5.2E-7	mg/m^3	M	6.1E-8	mg/kg-day	8.6E-4	mg/kg-day	--	--	0.000071
	Benzo[k]fluoranthene	4.6E-7	mg/m^3	--	4.6E-7	mg/m^3	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	1.6E-7	mg/m^3	--	1.6E-7	mg/m^3	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	5.4E-7	mg/m^3	--	5.4E-7	mg/m^3	M	--	--	ND	--	--	--	--
	2-Methylnaphthalene	1.2E-3	mg/m^3	--	1.2E-3	mg/m^3	M	1.4E-4	mg/kg-day	8.6E-4	mg/kg-day	--	--	0.16
	Naphthalene	3.0E-3	mg/m^3	--	3.0E-3	mg/m^3	M	3.5E-4	mg/kg-day	8.6E-4	mg/kg-day	--	--	0.41
	(Total)													0.76
													Total Hazard Index Across All Exposure Routes/Pathways:	0.76

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Johnson and Ettinger Model and site subsurface soil data.

[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Undeveloped Area Indoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.5.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[b]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	**Organic Analytes**													
	Acetone	3.6E-5	mg/m^3	--	3.6E-5	mg/m^3	M	4.3E-6	mg/kg-day	1.0E-1	mg/kg-day	--	--	0.000043
	Benzene	9.7E-5	mg/m^3	--	9.7E-5	mg/m^3	M	1.1E-5	mg/kg-day	8.6E-3	mg/kg-day	--	--	0.0013
	Chlorobenzene	4.2E-5	mg/m^3	--	4.2E-5	mg/m^3	M	5.0E-6	mg/kg-day	1.7E-2	mg/kg-day	--	--	0.00029
	Chloroethane	3.1E-4	mg/m^3	--	3.1E-4	mg/m^3	M	3.6E-5	mg/kg-day	2.9E+0	mg/kg-day	--	--	0.000012
	1,4-Dichlorobenzene	1.3E-5	mg/m^3	--	1.3E-5	mg/m^3	M	1.5E-6	mg/kg-day	2.3E-1	mg/kg-day	--	--	0.0000067
	1,2-Dichloroethene, isomers	8.7E-5	mg/m^3	--	8.7E-5	mg/m^3	M	1.0E-5	mg/kg-day	2.0E-2	mg/kg-day	--	--	0.00051
	4-Methyl-2-pentanone	6.3E-6	mg/m^3	--	6.3E-6	mg/m^3	M	7.4E-7	mg/kg-day	2.3E-2	mg/kg-day	--	--	0.000033
	Toluene	2.7E-3	mg/m^3	--	2.7E-3	mg/m^3	M	3.2E-4	mg/kg-day	1.1E-1	mg/kg-day	--	--	0.0029
	Xylenes	3.2E-4	mg/m^3	--	3.2E-4	mg/m^3	M	3.7E-5	mg/kg-day	2.9E-2	mg/kg-day	--	--	0.0013
	PAHs													
	Naphthalene	1.6E-5	mg/m^3	--	1.6E-5	mg/m^3	M	1.9E-6	mg/kg-day	8.6E-4	mg/kg-day	--	--	0.0022
	2-Methylnapthalene	1.1E-6	mg/m^3	--	1.1E-6	mg/m^3	M	1.3E-7	mg/kg-day	8.6E-4	mg/kg-day	--	--	0.00015
	(Total)													0.0088
													Total Hazard Index Across All Exposure Routes/Pathways:	0.0088

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference concentration established by EPA.
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Johnson and Ettinger Model and site subsurface soil data.

[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Developed Area Surface Soil (unpaved)
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.6.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Aluminum	12000	mg/kg	--	12000	mg/kg	M	5.9E-3	mg/kg-day	1.0E+0	mg/kg-day	--	--	0.0059
	Arsenic	11	mg/kg	--	11	mg/kg	M	5.4E-6	mg/kg-day	3.0E-4	mg/kg-day	--	--	0.018
	Chromium	97	mg/kg	--	97	mg/kg	M	4.7E-5	mg/kg-day	3.0E-3	mg/kg-day	--	--	0.016
	Copper	470	mg/kg	--	470	mg/kg	M	2.3E-4	mg/kg-day	4.0E-2	mg/kg-day	--	--	0.0057
	Iron	23000	mg/kg	--	23000	mg/kg	M	1.1E-2	mg/kg-day	3.0E-1	mg/kg-day	--	--	0.038
	Manganese	540	mg/kg	--	540	mg/kg	M	2.6E-4	mg/kg-day	4.7E-2	mg/kg-day	--	--	0.0057
	Mercury (total)	310	mg/kg	--	310	mg/kg	M	1.5E-4	mg/kg-day	3.0E-4	mg/kg-day	--	--	0.51
	Vanadium	140	mg/kg	--	140	mg/kg	M	6.8E-5	mg/kg-day	9.0E-3	mg/kg-day	--	--	0.0076
	Organic Analytes													
	PAHs													
	Benzo[a]pyrene	0.41	mg/kg	--	0.41	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	0.75	mg/kg	--	0.75	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.071	mg/kg	--	0.071	mg/kg	M	--	--	ND	--	--	--	--
	(Total)													0.60
Dermal Absorption	**Metals and Organometallic Analytes**													
	Arsenic	11	mg/kg	0.03	11	mg/kg	M	2.1E-6	mg/kg-day	3.0E-4	mg/kg-day	--	--	0.0071
	Organic Analytes													
	PAHs													
	Benzo[a]pyrene	0.41	mg/kg	0.13	0.41	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	0.75	mg/kg	0.13	0.75	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.071	mg/kg	0.13	0.071	mg/kg	M	--	--	ND	--	--	--	--
	(Total)													0.0071
													Total Hazard Index Across All Exposure Routes/Pathways:	0.61

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Developed Area Surface Soil (all)
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.7.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Aluminum	12000	mg/kg	--	12000	mg/kg	M	5.9E-3	mg/kg-day	1.0E+0	mg/kg-day	--	--	0.0059
	Arsenic	11	mg/kg	--	11	mg/kg	M	5.4E-6	mg/kg-day	3.0E-4	mg/kg-day	--	--	0.018
	Chromium	76	mg/kg	--	76	mg/kg	M	3.7E-5	mg/kg-day	3.0E-3	mg/kg-day	--	--	0.012
	Copper	689	mg/kg	--	689	mg/kg	M	3.4E-4	mg/kg-day	4.0E-2	mg/kg-day	--	--	0.0084
	Iron	21574	mg/kg	--	21574	mg/kg	M	1.1E-2	mg/kg-day	3.0E-1	mg/kg-day	--	--	0.035
	Manganese	399	mg/kg	--	399	mg/kg	M	2.0E-4	mg/kg-day	4.7E-2	mg/kg-day	--	--	0.0042
	Mercury (total)	2250	mg/kg	--	2250	mg/kg	M	1.1E-3	mg/kg-day	3.0E-4	mg/kg-day	--	--	3.7
	Thallium	2.4	mg/kg	--	2.4	mg/kg	M	1.2E-6	mg/kg-day	8.0E-5	mg/kg-day	--	--	0.015
	Vanadium	140	mg/kg	--	140	mg/kg	M	6.8E-5	mg/kg-day	9.0E-3	mg/kg-day	--	--	0.0076
	Organic Analytes													
	Benzene	0.29	mg/kg	--	0.3	mg/kg	M	1.4E-7	mg/kg-day	4.0E-3	mg/kg-day	--	--	0.000035
	PAHs													
	Benz[a]anthracene	0.85	mg/kg	--	0.85	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	0.68	mg/kg	--	0.68	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	1.1	mg/kg	--	1.1	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.15	mg/kg	--	0.15	mg/kg	M	--	--	ND	--	--	--	--
	(Total)													3.8
Dermal Absorption	**Metals and Organometallic Analytes**													
	Arsenic	11	mg/kg	0.03	11	mg/kg	M	2.1E-6	mg/kg-day	3.0E-4	mg/kg-day	--	--	0.0071
	Organic Analytes													
	PAHs													
	Benz[a]anthracene	0.85	mg/kg	0.13	0.85	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	0.68	mg/kg	0.13	0.68	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	1.1	mg/kg	0.13	1.1	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.15	mg/kg	0.13	0.15	mg/kg	M	--	--	ND	--	--	--	--
	(Total)													0.0071
													Total Hazard Index Across All Exposure Routes/Pathways:	3.8

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Developed Area Subsurface Soil (1-20 ft)
Receptor Population: Construction Worker
Receptor Age: Adult

Table 7.8.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Arsenic	9.9	mg/kg	--	9.9	mg/kg	M	1.2E-6	mg/kg-day	0.0003	mg/kg-day	--	--	0.0039
	Barium	818	mg/kg	--	818	mg/kg	M	9.6E-5	mg/kg-day	0.07	mg/kg-day	--	--	0.0014
	Chromium	131	mg/kg	--	131	mg/kg	M	1.5E-5	mg/kg-day	0.003	mg/kg-day	--	--	0.0051
	Copper	7420	mg/kg	--	7420	mg/kg	M	8.7E-4	mg/kg-day	0.040	mg/kg-day	--	--	0.022
	Iron	35400	mg/kg	--	35400	mg/kg	M	4.2E-3	mg/kg-day	0.30	mg/kg-day	--	--	0.014
	Manganese	812	mg/kg	--	812	mg/kg	M	9.5E-5	mg/kg-day	0.047	mg/kg-day	--	--	0.0020
	Mercury (total)	1269	mg/kg	--	1269	mg/kg	M	1.5E-4	mg/kg-day	0.0003	mg/kg-day	--	--	0.50
	Thallium	5.4	mg/kg	--	5.4	mg/kg	M	6.3E-7	mg/kg-day	0.00008	mg/kg-day	--	--	0.0079
	Organic Analytes													
	Benzene	2.8	mg/kg	--	2.8	mg/kg	M	3.3E-7	mg/kg-day	0.004	mg/kg-day	--	--	0.000082
	PAHs													
	2-Methylnaphthalene	0.45	mg/kg	--	0	mg/kg	M	5.3E-8	mg/kg-day	0.02	mg/kg-day	--	--	0.000003
	PCBs (as Aroclor 1254)	0.36	mg/kg	--	0.36	mg/kg	M	4.2E-8	mg/kg-day	0.00002	mg/kg-day	--	--	0.0021
	(Total)													0.55
Dermal Absorption	**Metals and Organometallic Analytes**													
	Arsenic	9.9	mg/kg	0.03	9.9	mg/kg	M	4.6E-07	mg/kg-day	0.0003	mg/kg-day	--	--	0.0015
	Organic Analytes													
	PAHs													
	2-Methylnaphthalene	0.45	mg/kg	0.13	0	mg/kg	M	9.1E-08	mg/kg-day	0.02	mg/kg-day	--	--	0.0000045
	PCBs (as Aroclor 1254)	0.36	mg/kg	0.14	0.36	mg/kg	M	7.8E-08	mg/kg-day	0.00002	mg/kg-day	--	--	0.0039
	(Total)													0.0054
													Total Hazard Index Across All Exposure Routes/Pathways:	0.56

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Undeveloped Area Surface Soil
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.9.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Aluminum	6157	mg/kg	--	6157	mg/kg	M	3.0E-3	mg/kg-day	1.0	mg/kg-day	--	--	0.0030
	Antimony	12.7	mg/kg	--	12.7	mg/kg	M	6.2E-6	mg/kg-day	0.0004	mg/kg-day	--	--	0.016
	Arsenic	9.6	mg/kg	--	9.6	mg/kg	M	4.7E-6	mg/kg-day	0.0003	mg/kg-day	--	--	0.016
	Barium	1530	mg/kg	--	1530	mg/kg	M	7.5E-4	mg/kg-day	0.070	mg/kg-day	--	--	0.011
	Cadmium	14.9	mg/kg	--	14.9	mg/kg	M	7.3E-6	mg/kg-day	0.01	mg/kg-day	--	--	0.00073
	Chromium	390	mg/kg	--	390	mg/kg	M	1.9E-4	mg/kg-day	0.003	mg/kg-day	--	--	0.064
	Copper	587	mg/kg	--	587	mg/kg	M	2.9E-4	mg/kg-day	0.040	mg/kg-day	--	--	0.0072
	Iron	34588	mg/kg	--	34588	mg/kg	M	1.7E-2	mg/kg-day	0.30	mg/kg-day	--	--	0.056
	Manganese	679	mg/kg	--	679	mg/kg	M	3.3E-4	mg/kg-day	0.047	mg/kg-day	--	--	0.0071
	Mercury (total)	507	mg/kg	--	507	mg/kg	M	2.5E-4	mg/kg-day	0.0003	mg/kg-day	--	--	0.83
	Methylmercury	0.32	mg/kg	--	0.32	mg/kg	M	1.6E-7	mg/kg-day	0.0001	mg/kg-day	--	--	0.0016
	Nickel	51.1	mg/kg	--	51.1	mg/kg	M	2.5E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0013
	Silver	22.1	mg/kg	--	22.1	mg/kg	M	1.1E-5	mg/kg-day	0.005	mg/kg-day	--	--	0.0022
	Thallium	4.2	mg/kg	--	4.2	mg/kg	M	2.1E-6	mg/kg-day	0.00008	mg/kg-day	--	--	0.026
	Vanadium	73.1	mg/kg	--	73.1	mg/kg	M	3.6E-5	mg/kg-day	0.009	mg/kg-day	--	--	0.0040
	Zinc	18443	mg/kg	--	18443	mg/kg	M	9.0E-3	mg/kg-day	0.30	mg/kg-day	--	--	0.030
	Organic Analytes													
	Bis[2-ethylhexyl]phthalate	49	mg/kg	--	49	mg/kg	M	2.4E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0012
	PAHs													
	Benz[a]anthracene	2.4	mg/kg	--	2.4	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	2.8	mg/kg	--	2.8	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	3.2	mg/kg	--	3.2	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.90	mg/kg	--	0.90	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	--	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Naphthalene	5.1	mg/kg	--	5.1	mg/kg	M	2.5E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00012
	2-Methylnaphthalene	2.5	mg/kg	--	2.5	mg/kg	M	1.2E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.000060
	PCBs as Aroclor 1254	4.4	mg/kg	--	5.0	mg/kg	M	2.2E-6	mg/kg-day	0.00002	mg/kg-day	--	--	0.11
	(Total)													1.2
Dermal Absorption	**Metals and Organometallic Analytes**													
	Arsenic	9.6	mg/kg	0.03	9.6	mg/kg	M	1.9E-06	mg/kg-day	0.0003	mg/kg-day	--	--	0.0062
	Cadmium	14.9	mg/kg	0.001	14.9	mg/kg	M	9.6E-8	mg/kg-day	0.0005	mg/kg-day	--	--	0.00019
	Organic Analytes													
	Bis[2-ethylhexyl]phthalate	49	mg/kg	0.10	49	mg/kg	M	3.1E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0016
	PAHs													
	Benz[a]anthracene	2.4	mg/kg	0.13	2.4	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	2.8	mg/kg	0.13	2.8	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	3.2	mg/kg	0.13	3.2	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.90	mg/kg	0.13	0.90	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	0.13	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Naphthalene	5.1	mg/kg	0.13	5.1	mg/kg	M	4.3E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00021
	2-Methylnaphthalene	2.5	mg/kg	0.13	2.5	mg/kg	M	2.1E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00010
	PCBs as Aroclor 1254	4.4	mg/kg	0.14	4.4	mg/kg	M	4.0E-6	mg/kg-day	0.00002	mg/kg-day	--	--	0.20
	(Total)													0.21
													Total Hazard Index Across All Exposure Routes/Pathways:	1.4

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Undeveloped Area Surface Sediment
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Table 7.10.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Aluminum	13900	mg/kg	--	13900	mg/kg	M	7.2E-3	mg/kg-day	1.0	mg/kg-day	--	--	0.0072
	Arsenic	8.8	mg/kg	--	8.8	mg/kg	M	4.5E-6	mg/kg-day	0.0003	mg/kg-day	--	--	0.015
	Cadmium	9.1	mg/kg	--	9.1	mg/kg	M	4.7E-6	mg/kg-day	0.01	mg/kg-day	--	--	0.00047
	Chromium	156	mg/kg	--	156	mg/kg	M	8.1E-5	mg/kg-day	0.003	mg/kg-day	--	--	0.027
	Iron	21400	mg/kg	--	21400	mg/kg	M	1.1E-2	mg/kg-day	0.30	mg/kg-day	--	--	0.037
	Mercury (total)	1290	mg/kg	--	1290	mg/kg	M	6.7E-4	mg/kg-day	0.0003	mg/kg-day	--	--	2.2
	Methylmercury	0.13	mg/kg	--	0.13	mg/kg	M	6.5E-8	mg/kg-day	0.0001	mg/kg-day	--	--	0.00065
	Thallium	4.8	mg/kg	--	4.8	mg/kg	M	2.5E-6	mg/kg-day	0.00008	mg/kg-day	--	--	0.031
	Vanadium	69	mg/kg	--	69	mg/kg	M	3.6E-5	mg/kg-day	0.009	mg/kg-day	--	--	0.0040
	Zinc	3540	mg/kg	--	3540	mg/kg	M	1.8E-3	mg/kg-day	0.30	mg/kg-day	--	--	0.0061
	Organic Analytes													
	PAHs													
	Benz[a]anthracene	1.7	mg/kg	--	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	1.6	mg/kg	--	1.6	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	1.8	mg/kg	--	1.8	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.32	mg/kg	--	0.32	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.2	mg/kg	--	1.2	mg/kg	M	--	--	ND	--	--	--	--
	PCBs as Arocior 1254	0.73	mg/kg	--	0.73	mg/kg	M	3.8E-7	mg/kg-day	0.00002	mg/kg-day	--	--	0.019
	(Total)													2.4
Dermal	**Metals and Organometallic Analytes**													
Absorption	Arsenic	8.8	mg/kg	0.03	8.8	mg/kg	M	5.4E-07	mg/kg-day	0.0003	mg/kg-day	--	--	0.0018
	Cadmium	9.1	mg/kg	0.001	9.1	mg/kg	M	1.9E-8	mg/kg-day	0.0005	mg/kg-day	--	--	0.000038
	Organic Analytes													
	PAHs													
	Benz[a]anthracene	1.7	mg/kg	0.13	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	1.6	mg/kg	0.13	1.6	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	1.8	mg/kg	0.13	1.8	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.32	mg/kg	0.13	0.32	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.2	mg/kg	0.13	1.2	mg/kg	M	--	--	ND	--	--	--	--
	PCBs as Arocior 1254	0.73	mg/kg	0.14	0.73	mg/kg	M	2.1E-7	mg/kg-day	0.00002	mg/kg-day	--	--	0.011
	(Total)													0.012
													Total Hazard Index Across All Exposure Routes/Pathways:	2.4

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Undeveloped Area Surface Sediment
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent/Pre-Adolescent

Table 7.11.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Aluminum	13900	mg/kg	--	13900	mg/kg	M	1.0E-2	mg/kg-day	1.0	mg/kg-day	--	--	0.010
	Arsenic	8.8	mg/kg	--	8.8	mg/kg	M	6.5E-6	mg/kg-day	0.0003	mg/kg-day	--	--	0.022
	Cadmium	9.1	mg/kg	--	9.1	mg/kg	M	6.7E-6	mg/kg-day	0.01	mg/kg-day	--	--	0.00067
	Chromium	156	mg/kg	--	156	mg/kg	M	1.2E-4	mg/kg-day	0.003	mg/kg-day	--	--	0.038
	Iron	21400	mg/kg	--	21400	mg/kg	M	1.6E-2	mg/kg-day	0.30	mg/kg-day	--	--	0.053
	Mercury (total)	1290	mg/kg	--	1290	mg/kg	M	9.5E-4	mg/kg-day	0.0003	mg/kg-day	--	--	3.2
	Methylmercury	0.13	mg/kg	--	0.13	mg/kg	M	9.3E-8	mg/kg-day	0.0001	mg/kg-day	--	--	0.00093
	Thallium	4.8	mg/kg	--	4.8	mg/kg	M	3.5E-6	mg/kg-day	0.00008	mg/kg-day	--	--	0.044
	Vanadium	69.4	mg/kg	--	69.4	mg/kg	M	5.1E-5	mg/kg-day	0.009	mg/kg-day	--	--	0.0057
	Zinc	3540	mg/kg	--	3540	mg/kg	M	2.6E-3	mg/kg-day	0.30	mg/kg-day	--	--	0.0087
	Organic Analytes													
	PAHs													
	Benz[a]anthracene	1.7	mg/kg	--	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	1.6	mg/kg	--	1.6	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	1.8	mg/kg	--	1.8	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.32	mg/kg	--	0.32	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.2	mg/kg	--	1.2	mg/kg	M	--	--	ND	--	--	--	--
	PCBs as Aroclor 1254	0.73	mg/kg	--	0.73	mg/kg	M	5.4E-7	mg/kg-day	0.00002	mg/kg-day	--	--	0.027
	(Total)													3.4
Dermal Absorption	**Metals and Organometallic Analytes**													
	Arsenic	8.8	mg/kg	0.03	8.8	mg/kg	M	1.6E-06	mg/kg-day	0.0003	mg/kg-day	--	--	0.0052
	Cadmium	9.1	mg/kg	0.001	9.1	mg/kg	M	5.4E-8	mg/kg-day	0.0005	mg/kg-day	--	--	0.00011
	Organic Analytes													
	PAHs													
	Benz[a]anthracene	1.7	mg/kg	0.13	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	1.6	mg/kg	0.13	1.6	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	1.8	mg/kg	0.13	1.8	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.32	mg/kg	0.13	0.32	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.2	mg/kg	0.13	1.2	mg/kg	M	--	--	ND	--	--	--	--
	PCBs as Aroclor 1254	0.73	mg/kg	0.14	0.73	mg/kg	M	6.0E-7	mg/kg-day	0.00002	mg/kg-day	--	--	0.030
	(Total)													0.035
													Total Hazard Index Across All Exposure Routes/Pathways:	3.4

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Undeveloped Area Surface Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Table 7.12.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Aluminum	6157	mg/kg	--	6157	mg/kg	M	3.2E-3	mg/kg-day	1.0	mg/kg-day	--	--	0.0032
	Antimony	12.7	mg/kg	--	12.7	mg/kg	M	6.6E-6	mg/kg-day	0.0004	mg/kg-day	--	--	0.016
	Arsenic	9.6	mg/kg	--	9.6	mg/kg	M	5.0E-6	mg/kg-day	0.0003	mg/kg-day	--	--	0.017
	Barium	1530	mg/kg	--	1530	mg/kg	M	7.9E-4	mg/kg-day	0.07	mg/kg-day	--	--	0.011
	Cadmium	14.9	mg/kg	--	14.9	mg/kg	M	7.7E-6	mg/kg-day	0.01	mg/kg-day	--	--	0.00077
	Chromium	390	mg/kg	--	390	mg/kg	M	2.0E-4	mg/kg-day	0.003	mg/kg-day	--	--	0.067
	Copper	587	mg/kg	--	587	mg/kg	M	3.0E-4	mg/kg-day	0.04	mg/kg-day	--	--	0.0076
	Iron	34588	mg/kg	--	34588	mg/kg	M	1.8E-2	mg/kg-day	0.30	mg/kg-day	--	--	0.060
	Manganese	679	mg/kg	--	679	mg/kg	M	3.5E-4	mg/kg-day	0.047	mg/kg-day	--	--	0.0075
	Mercury (total)	507	mg/kg	--	507	mg/kg	M	2.6E-4	mg/kg-day	0.0003	mg/kg-day	--	--	0.87
	Methylmercury	0.32	mg/kg	--	0.32	mg/kg	M	1.7E-7	mg/kg-day	0.0001	mg/kg-day	--	--	0.0017
	Nickel	51.1	mg/kg	--	51.1	mg/kg	M	2.6E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0013
	Silver	22.1	mg/kg	--	22.1	mg/kg	M	1.1E-5	mg/kg-day	0.005	mg/kg-day	--	--	0.0023
	Thallium	4.2	mg/kg	--	4.2	mg/kg	M	2.2E-6	mg/kg-day	0.00008	mg/kg-day	--	--	0.027
	Vanadium	73.1	mg/kg	--	73.1	mg/kg	M	3.8E-5	mg/kg-day	0.009	mg/kg-day	--	--	0.0042
	Zinc	18443	mg/kg	--	18443	mg/kg	M	9.5E-3	mg/kg-day	0.30	mg/kg-day	--	--	0.032
	Organic Analytes													
	Bis[2-ethylhexyl]phthalate	49	mg/kg	--	49	mg/kg	M	2.5E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0013
	PAHs													
	Benz[a]anthracene	2.4	mg/kg	--	2.4	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	2.8	mg/kg	--	2.8	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	3.2	mg/kg	--	3.2	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.90	mg/kg	--	0.90	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	--	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Naphthalene	5.1	mg/kg	--	5.1	mg/kg	M	2.6E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00013
	2-Methylnaphthalene	2.5	mg/kg	--	2.5	mg/kg	M	1.3E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.000064
	PCBs as Aroclor 1254	4.4	mg/kg	--	4.4	mg/kg	M	2.3E-6	mg/kg-day	0.00002	mg/kg-day	--	--	0.11
	(Total)													1.2
Dermal Absorption	**Metals and Organometallic Analytes**													
	Arsenic	9.6	mg/kg	0.03	9.6	mg/kg	M	5.9E-07	mg/kg-day	0.0003	mg/kg-day	--	--	0.0020
	Cadmium	14.9	mg/kg	0.001	14.9	mg/kg	M	3.1E-8	mg/kg-day	0.0005	mg/kg-day	--	--	0.000061
	Organic Analytes													
	Bis[2-ethylhexyl]phthalate	49	mg/kg	0.10	49	mg/kg	M	1.0E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.00050
	PAHs													
	Benz[a]anthracene	2.4	mg/kg	0.13	2.4	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	2.8	mg/kg	0.13	2.8	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	3.2	mg/kg	0.13	3.2	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.90	mg/kg	0.13	0.90	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	0.13	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Naphthalene	5.1	mg/kg	0.13	5.1	mg/kg	M	1.4E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.000068
	2-Methylnaphthalene	2.5	mg/kg	0.13	2.5	mg/kg	M	6.6E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.000033
	PCBs as Aroclor 1254	4.4	mg/kg	0.14	4.4	mg/kg	M	1.3E-6	mg/kg-day	0.00002	mg/kg-day	--	--	0.063
	(Total)													0.066
													Total Hazard Index Across All Exposure Routes/Pathways:	1.3

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Undeveloped Area Surface Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent/Pre-Adolescent

Table 7.13.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Aluminum	6157	mg/kg	--	6157	mg/kg	M	4.5E-3	mg/kg-day	1.0	mg/kg-day	--	--	0.0045
	Antimony	12.7	mg/kg	--	12.7	mg/kg	M	9.4E-6	mg/kg-day	0.0004	mg/kg-day	--	--	0.023
	Arsenic	9.6	mg/kg	--	9.6	mg/kg	M	7.1E-6	mg/kg-day	0.0003	mg/kg-day	--	--	0.024
	Barium	1530	mg/kg	--	1530	mg/kg	M	1.1E-3	mg/kg-day	0.07	mg/kg-day	--	--	0.016
	Cadmium	14.9	mg/kg	--	14.9	mg/kg	M	1.1E-5	mg/kg-day	0.01	mg/kg-day	--	--	0.0011
	Chromium	390	mg/kg	--	390	mg/kg	M	2.9E-4	mg/kg-day	0.003	mg/kg-day	--	--	0.096
	Copper	587	mg/kg	--	587	mg/kg	M	4.3E-4	mg/kg-day	0.04	mg/kg-day	--	--	0.011
	Iron	34588	mg/kg	--	34588	mg/kg	M	2.6E-2	mg/kg-day	0.30	mg/kg-day	--	--	0.085
	Manganese	679	mg/kg	--	679	mg/kg	M	5.0E-4	mg/kg-day	0.047	mg/kg-day	--	--	0.011
	Mercury (total)	507	mg/kg	--	507	mg/kg	M	3.7E-4	mg/kg-day	0.0003	mg/kg-day	--	--	1.2
	Methylmercury	0.32	mg/kg	--	0.32	mg/kg	M	2.4E-7	mg/kg-day	0.0001	mg/kg-day	--	--	0.0024
	Nickel	51.1	mg/kg	--	51.1	mg/kg	M	3.8E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0019
	Silver	22.1	mg/kg	--	22.1	mg/kg	M	1.6E-5	mg/kg-day	0.005	mg/kg-day	--	--	0.0033
	Thallium	4.2	mg/kg	--	4.2	mg/kg	M	3.1E-6	mg/kg-day	0.00008	mg/kg-day	--	--	0.039
	Vanadium	73.1	mg/kg	--	73.1	mg/kg	M	5.4E-5	mg/kg-day	0.009	mg/kg-day	--	--	0.0060
	Zinc	18443	mg/kg	--	18443	mg/kg	M	1.4E-2	mg/kg-day	0.30	mg/kg-day	--	--	0.045
	Organic Analytes													
	Bis[2-ethylhexyl]phthalate	49	mg/kg	--	49	mg/kg	M	3.6E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0018
	PAHs													
	Benz[a]anthracene	2.4	mg/kg	--	2.4	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	2.8	mg/kg	--	2.8	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	3.2	mg/kg	--	3.2	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.90	mg/kg	--	0.90	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	--	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Naphthalene	5.1	mg/kg	--	5.1	mg/kg	M	3.8E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00019
	2-Methylnaphthalene	2.5	mg/kg	--	2.5	mg/kg	M	1.8E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.000091
	PCBs as Aroclor 1254	4.4	mg/kg	--	4.4	mg/kg	M	3.2E-6	mg/kg-day	0.00002	mg/kg-day	--	--	0.16
	(Total)													1.8
Dermal Absorption	**Metals and Organometallic Analytes**													
	Arsenic	9.6	mg/kg	0.03	9.6	mg/kg	M	1.7E-06	mg/kg-day	0.0003	mg/kg-day	--	--	0.0057
	Cadmium	14.9	mg/kg	0.001	14.9	mg/kg	M	8.8E-8	mg/kg-day	0.0005	mg/kg-day	--	--	0.00018
	Organic Analytes													
	Bis[2-ethylhexyl]phthalate	49	mg/kg	0.10	49	mg/kg	M	2.9E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0014
	PAHs													
	Benz[a]anthracene	2.4	mg/kg	0.13	2.4	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	2.8	mg/kg	0.13	2.8	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	3.2	mg/kg	0.13	3.2	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.90	mg/kg	0.13	0.90	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	0.13	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Naphthalene	5.1	mg/kg	0.13	5.1	mg/kg	M	3.9E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00020
	2-Methylnaphthalene	2.5	mg/kg	0.13	2.5	mg/kg	M	1.9E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.000095
	PCBs as Aroclor 1254	4.4	mg/kg	0.14	4.4	mg/kg	M	3.6E-6	mg/kg-day	0.00002	mg/kg-day	--	--	0.18
	(Total)													0.19
													Total Hazard Index Across All Exposure Routes/Pathways:	2.0

Note:
-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d). Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure (U.S. EPA 2001).
[c]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Undeveloped Area Subsurface Soil (1-20 ft.)
Receptor Population: Construction Worker
Receptor Age: Adult

Table 7.14.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Aluminum	13615	mg/kg	--	13615	mg/kg	M	1.6E-3	mg/kg-day	1.0	mg/kg-day	--	--	0.0016
	Antimony	14.5	mg/kg	--	14.5	mg/kg	M	1.7E-6	mg/kg-day	0.0004	mg/kg-day	--	--	0.0043
	Arsenic	22.0	mg/kg	--	22.0	mg/kg	M	2.6E-6	mg/kg-day	0.0003	mg/kg-day	--	--	0.0086
	Barium	1172	mg/kg	--	1172	mg/kg	M	1.4E-4	mg/kg-day	0.07	mg/kg-day	--	--	0.0020
	Cadmium	12.1	mg/kg	--	12.1	mg/kg	M	1.4E-6	mg/kg-day	0.01	mg/kg-day	--	--	0.00014
	Chromium	308	mg/kg	--	308	mg/kg	M	3.6E-5	mg/kg-day	0.003	mg/kg-day	--	--	0.012
	Copper	956	mg/kg	--	956	mg/kg	M	1.1E-4	mg/kg-day	0.04	mg/kg-day	--	--	0.0028
	Iron	75160	mg/kg	--	75160	mg/kg	M	8.8E-3	mg/kg-day	0.30	mg/kg-day	--	--	0.029
	Manganese	811	mg/kg	--	811	mg/kg	M	9.5E-5	mg/kg-day	0.047	mg/kg-day	--	--	0.0020
	Mercury (total)	736	mg/kg	--	736	mg/kg	M	8.6E-5	mg/kg-day	0.0003	mg/kg-day	--	--	0.29
	Methylmercury	0.0074	mg/kg	--	0.0074	mg/kg	M	8.7E-10	mg/kg-day	0.0001	mg/kg-day	--	--	0.0000087
	Nickel	82.0	mg/kg	--	82.0	mg/kg	M	9.6E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00048
	Selenium	4.5	mg/kg	--	4.5	mg/kg	M	5.3E-7	mg/kg-day	0.005	mg/kg-day	--	--	0.00011
	Silver	37.3	mg/kg	--	37.3	mg/kg	M	4.4E-6	mg/kg-day	0.005	mg/kg-day	--	--	0.00088
	Thallium	2.6	mg/kg	--	2.6	mg/kg	M	3.1E-7	mg/kg-day	0.00008	mg/kg-day	--	--	0.0038
	Vanadium	127	mg/kg	--	127	mg/kg	M	1.5E-5	mg/kg-day	0.009	mg/kg-day	--	--	0.0017
	Zinc	4687	mg/kg	--	4687	mg/kg	M	5.5E-4	mg/kg-day	0.30	mg/kg-day	--	--	0.0018
	Organic Analytes													
	Carbazole	0.89	mg/kg	--	0.89	mg/kg	M	--	--	ND	--	--	--	--
	Toluene	7.3	mg/kg	--	7.3	mg/kg	M	8.6E-7	mg/kg-day	0.2	mg/kg-day	--	--	0.0000043
	Xylenes	11	mg/kg	--	11	mg/kg	M	1.3E-6	mg/kg-day	0.2	mg/kg-day	--	--	0.0000066
	PAHs													
	2-Methylnaphthalene	0.45	mg/kg	--	0.45	mg/kg	M	5.3E-8	mg/kg-day	0.02	mg/kg-day	--	--	0.0000026
	Benz[a]anthracene	2.3	mg/kg	--	2.3	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	1.9	mg/kg	--	1.9	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	2.5	mg/kg	--	2.5	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[ghi]perylene	0.83	mg/kg	--	0.83	mg/kg	M	9.7E-8	mg/kg-day	0.020	mg/kg-day	--	--	0.0000048
	Benzo[k]fluoranthene	0.74	mg/kg	--	0.74	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.26	mg/kg	--	0.26	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	0.86	mg/kg	--	0.86	mg/kg	M	--	--	ND	--	--	--	--
	Naphthalene	0.85	mg/kg	--	0.85	mg/kg	M	9.9E-8	mg/kg-day	0.02	mg/kg-day	--	--	0.0000050
	PCBs (as Aroclor 1254)	4.4	mg/kg	--	4.4	mg/kg	M	5.2E-7	mg/kg-day	0.00002	mg/kg-day	--	--	0.026
	(Total)													0.39

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Undeveloped Area Subsurface Soil (1-20 ft.)
Receptor Population: Construction Worker
Receptor Age: Adult

Table 7.14.RME (continued)
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	**Metals and Organometallic Analytes**													
Absorption	Arsenic	22.0	mg/kg	0.03	22.0	mg/kg	M	1.0E-06	mg/kg-day	0.0003	mg/kg-day	--	--	0.0034
	Cadmium	12.1	mg/kg	0.001	12.1	mg/kg	M	1.9E-08	mg/kg-day	0.0005	mg/kg-day	--	--	0.000038
	Organic Analytes													
	Carbazole	0.89	mg/kg	0.10	0.89	mg/kg	M	--	--	ND	--	--	--	--
	PAHs													
	2-Methylnaphthalene	0.45	mg/kg	0.13	0.45	mg/kg	M	9.1E-08	mg/kg-day	0.02	mg/kg-day	--	--	0.0000045
	Benz[a]anthracene	2.3	mg/kg	0.13	2.3	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	1.9	mg/kg	0.13	1.9	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	2.5	mg/kg	0.13	2.5	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[ghi]perylene	0.83	mg/kg	0.13	0.83	mg/kg	M	1.664E-07	mg/kg-day	0.02	mg/kg-day	--	--	0.0000083
	Benzo[k]fluoranthene	0.74	mg/kg	0.13	0.74	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.26	mg/kg	0.13	0.26	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	0.86	mg/kg	0.13	0.86	mg/kg	M	--	--	ND	--	--	--	--
	Naphthalene	0.85	mg/kg	0.13	0.85	mg/kg	M	1.7E-07	mg/kg-day	0.02	mg/kg-day	--	--	0.0000085
	PCBs (as Aroclor 1254)	4.4	mg/kg	0.14	4.4	mg/kg	M	9.5E-07	mg/kg-day	0.00002	mg/kg-day	--	--	0.048
	(Total)													0.051
													Total Hazard Index Across All Exposure Routes/Pathways:	0.44

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Undeveloped Area Surface Water
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Table 7.15.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Iron	2.6	mg/L	--	2.6	mg/L	M	1.6E-4	mg/kg-day	0.3	mg/kg-day	--	--	0.00054
	Manganese	0.41	mg/L	--	0.41	mg/L	M	2.6E-5	mg/kg-day	0.047	mg/kg-day	--	--	0.00055
	Mercury (total)	0.018	mg/L	--	0.018	mg/L	M	1.1E-6	mg/kg-day	0.0003	mg/kg-day	--	--	0.0036
	Methylmercury	2.8E-6	mg/L	--	2.8E-6	mg/L	M	1.7E-10	mg/kg-day	0.0001	mg/kg-day	--	--	0.0000017
	(Total)													0.0047
Dermal Absorption	**Metals and Organometallic Analytes**													
	Iron	2.6	mg/L	0.001	2.6	mg/L	M	7.7E-5	mg/kg-day	0.3	mg/kg-day	--	--	0.00026
	Manganese	0.41	mg/L	0.001	0.41	mg/L	M	1.2E-5	mg/kg-day	0.0019	mg/kg-day	--	--	0.0065
	Mercury (total)	0.018	mg/L	0.001	0.018	mg/L	M	5.2E-7	mg/kg-day	0.000021	mg/kg-day	--	--	0.025
	Methylmercury	2.8E-6	mg/L	0.001	2.8E-6	mg/L	M	8.2E-11	mg/kg-day	0.0001	mg/kg-day	--	--	0.00000082
	(Total)													0.031
													Total Hazard Index Across All Exposure Routes/Pathways:	0.036

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Undeveloped Area Surface Water
Receptor Population: Trespasser
Receptor Age: Adolescent/Pre-Adolescent

Table 7.16.RME
Calculation of Noncancer Hazards
Adult Surface Water Exposure: Reasonable Maximum Recreational Scenario
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Iron	2.6	mg/L	--	2.6	mg/L	M	2.3E-4	mg/kg-day	0.3	mg/kg-day	--	--	0.00077
	Manganese	0.41	mg/L	--	0.41	mg/L	M	3.7E-5	mg/kg-day	0.047	mg/kg-day	--	--	0.00078
	Mercury (total)	0.018	mg/L	--	0.018	mg/L	M	1.6E-6	mg/kg-day	0.0003	mg/kg-day	--	--	0.0052
	Methylmercury	2.8E-6	mg/L	--	2.8E-6	mg/L	M	2.5E-10	mg/kg-day	0.0001	mg/kg-day	--	--	0.0000025
	(Total)													0.0068
Dermal Absorption	**Metals and Organometallic Analytes**													
	Iron	2.6	mg/L	0.001	2.6	mg/L	M	7.7E-5	mg/kg-day	0.3	mg/kg-day	--	--	0.00026
	Manganese	0.41	mg/L	0.001	0.41	mg/L	M	1.2E-5	mg/kg-day	0.0019	mg/kg-day	--	--	0.0065
	Mercury (total)	0.018	mg/L	0.001	0.018	mg/L	M	5.2E-7	mg/kg-day	0.000021	mg/kg-day	--	--	0.025
	Methylmercury	2.8E-6	mg/L	0.001	2.8E-6	mg/L	M	8.2E-11	mg/kg-day	0.0001	mg/kg-day	--	--	0.00000082
	(Total)													0.032
													Total Hazard Index Across All Exposure Routes/Pathways:	0.038

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.17.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Arsenic	0.0078	mg/L	--	0.0078	mg/L	M	7.6E-5	mg/kg-day	0.0003	mg/kg-day	--	--	0.25
	Barium	0.41	mg/L	--	0.41	mg/L	M	4.0E-3	mg/kg-day	0.07	mg/kg-day	--	--	0.057
	Cadmium	0.0013	mg/L	--	0.0013	mg/L	M	1.3E-5	mg/kg-day	0.005	mg/kg-day	--	--	0.0025
	Copper	0.016	mg/L	--	0.016	mg/L	M	1.5E-4	mg/kg-day	0.04	mg/kg-day	--	--	0.0039
	Iron	15.4	mg/L	--	15.4	mg/L	M	1.5E-1	mg/kg-day	0.30	mg/kg-day	--	--	0.50
	Manganese	1.9	mg/L	--	1.9	mg/L	M	1.8E-2	mg/kg-day	0.047	mg/kg-day	--	--	0.39
	Mercury (total)	0.0083	mg/L	--	0.0083	mg/L	M	8.1E-5	mg/kg-day	0.0003	mg/kg-day	--	--	0.27
	Methylmercury	0.000023	mg/L	--	0.000023	mg/L	M	2.2E-7	mg/kg-day	0.0001	mg/kg-day	--	--	0.0022
	Nickel	0.022	mg/L	--	0.022	mg/L	M	2.2E-4	mg/kg-day	0.02	mg/kg-day	--	--	0.011
	Thallium	0.0029	mg/L	--	0.0029	mg/L	M	2.8E-5	mg/kg-day	0.00008	mg/kg-day	--	--	0.35
	Vanadium	0.025	mg/L	--	0.025	mg/L	M	2.4E-4	mg/kg-day	0.009	mg/kg-day	--	--	0.027
	Organic Analytes													
	Acetone	0.053	mg/L	--	0.053	mg/L	M	5.2E-4	mg/kg-day	0.9	mg/kg-day	--	--	0.00058
	Benzene	0.010	mg/L	--	0.010	mg/L	M	1.0E-4	mg/kg-day	0.004	mg/kg-day	--	--	0.025
	Chlorobenzene	0.0081	mg/L	--	0.0081	mg/L	M	7.9E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0040
	Chloroethane	0.0063	mg/L	--	0.0063	mg/L	M	6.2E-5	mg/kg-day	0.4	mg/kg-day	--	--	0.00015
	1,2-Dichloroethene, isomers	0.0083	mg/L	--	0.0083	mg/L	M	8.1E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0041
	1,4-Dichlorobenzene	0.0040	mg/L	--	0.0040	mg/L	M	3.9E-5	mg/kg-day	0.03	mg/kg-day	--	--	0.0013
	4-Methyl-2-pentanone	0.0072	mg/L	--	0.0072	mg/L	M	7.0E-5	mg/kg-day	0.08	mg/kg-day	--	--	0.00088
	4-Methylphenol	0.0094	mg/L	--	0.0094	mg/L	M	9.2E-5	mg/kg-day	0.005	mg/kg-day	--	--	0.018
	Toluene	0.27	mg/L	--	0.27	mg/L	M	2.7E-3	mg/kg-day	0.2	mg/kg-day	--	--	0.013
	Xylene	0.037	mg/L	--	0.037	mg/L	M	3.6E-4	mg/kg-day	0.2	mg/kg-day	--	--	0.0018
	PAHs													
	2-Methylnaphthalene	0.0010	mg/L	--	0.0010	mg/L	M	9.8E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00049
	Naphthalene	0.013	mg/L	--	0.013	mg/L	M	1.3E-4	mg/kg-day	0.02	mg/kg-day	--	--	0.0063
	(Total)													2.0

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.17.RME (continued)
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	**Metals and Organometallic Analytes**													
Absorption	Arsenic	0.0078	mg/L	0.001	0.0078	mg/L	M	3.6E-9	mg/kg-day	0.0003	mg/kg-day	--	--	0.000012
	Barium	0.41	mg/L	0.001	0.41	mg/L	M	1.9E-7	mg/kg-day	0.0049	mg/kg-day	--	--	0.000039
	Cadmium	0.0013	mg/L	0.001	0.0013	mg/L	M	6.0E-10	mg/kg-day	0.000125	mg/kg-day	--	--	0.0000048
	Copper	0.016	mg/L	0.001	0.016	mg/L	M	7.4E-9	mg/kg-day	0.0004	mg/kg-day	--	--	0.000018
	Iron	15.4	mg/L	0.001	15.4	mg/L	M	7.1E-6	mg/kg-day	0.3	mg/kg-day	--	--	0.000024
	Manganese	1.9	mg/L	0.001	1.9	mg/L	M	8.7E-7	mg/kg-day	0.0019	mg/kg-day	--	--	0.00047
	Mercury (total)	0.0083	mg/L	0.001	0.0083	mg/L	M	3.9E-9	mg/kg-day	0.000021	mg/kg-day	--	--	0.00018
	Methylmercury	0.000023	mg/L	0.001	0.000023	mg/L	M	1.0E-11	mg/kg-day	0.0001	mg/kg-day	--	--	0.00000010
	Nickel	0.022	mg/L	0.0001	0.022	mg/L	M	1.0E-9	mg/kg-day	0.0008	mg/kg-day	--	--	0.0000013
	Thallium	0.0029	mg/L	0.001	0.0029	mg/L	M	1.3E-9	mg/kg-day	0.00008	mg/kg-day	--	--	0.000017
	Vanadium	0.025	mg/L	0.001	0.025	mg/L	M	1.1E-8	mg/kg-day	0.00023	mg/kg-day	--	--	0.000049
	Organic Analytes													
	Acetone	0.053	mg/L	0.0014	0.053	mg/L	M	3.5E-8	mg/kg-day	0.9	mg/kg-day	--	--	0.000000039
	Benzene	0.010	mg/L	0.021	0.010	mg/L	M	1.0E-7	mg/kg-day	0.004	mg/kg-day	--	--	0.000025
	Chlorobenzene	0.0081	mg/L	0.041	0.0081	mg/L	M	1.5E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.0000077
	Chloroethane	0.0063	mg/L	0.0080	0.0063	mg/L	M	2.3E-8	mg/kg-day	0.4	mg/kg-day	--	--	0.000000059
	1,2-Dichloroethene, isomers	0.0083	mg/L	0.0013	0.0083	mg/L	M	5.0E-9	mg/kg-day	0.02	mg/kg-day	--	--	0.00000025
	1,4-Dichlorobenzene	0.0040	mg/L	0.062	0.0040	mg/L	M	1.2E-7	mg/kg-day	0.03	mg/kg-day	--	--	0.0000038
	4-Methyl-2-pentanone	0.0072	mg/L	0.000036	0.0072	mg/L	M	1.2E-10	mg/kg-day	0.08	mg/kg-day	--	--	0.0000000015
	4-Methylphenol	0.0094	mg/L	0.004	0.0094	mg/L	M	1.9E-8	mg/kg-day	0.005	mg/kg-day	--	--	0.0000038
	Toluene	0.27	mg/L	0.045	0.27	mg/L	M	5.7E-6	mg/kg-day	0.2	mg/kg-day	--	--	0.000028
	Xylene	0.037	mg/L	0.081	0.037	mg/L	M	1.4E-6	mg/kg-day	0.2	mg/kg-day	--	--	0.0000070
	PAHs													
	2-Methylnaphthalene	0.0010	mg/L	0.069	0.0010	mg/L	M	3.2E-8	mg/kg-day	0.02	mg/kg-day	--	--	0.0000016
	Naphthalene	0.013	mg/L	0.069	0.013	mg/L	M	4.1E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.000021
	(Total)													0.00091
													Total Hazard Index Across All Exposure Routes/Pathways:	2.0

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Resident
Receptor Age: Adult

Table 7.18.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Arsenic	0.0078	mg/L	--	0.0078	mg/L	M	2.1E-4	mg/kg-day	0.0003	mg/kg-day	--	--	0.71
	Barium	0.41	mg/L	--	0.41	mg/L	M	1.1E-2	mg/kg-day	0.07	mg/kg-day	--	--	0.16
	Cadmium	0.0013	mg/L	--	0.0013	mg/L	M	3.6E-5	mg/kg-day	0.005	mg/kg-day	--	--	0.0071
	Copper	0.016	mg/L	--	0.016	mg/L	M	4.3E-4	mg/kg-day	0.04	mg/kg-day	--	--	0.011
	Iron	15.4	mg/L	--	15.4	mg/L	M	4.2E-1	mg/kg-day	0.3	mg/kg-day	--	--	1.4
	Manganese	1.9	mg/L	--	1.9	mg/L	M	5.1E-2	mg/kg-day	0.047	mg/kg-day	--	--	1.1
	Mercury (total)	0.0083	mg/L	--	0.0083	mg/L	M	2.3E-4	mg/kg-day	0.0003	mg/kg-day	--	--	0.76
	Methylmercury	0.000023	mg/L	--	0.000023	mg/L	M	6.2E-7	mg/kg-day	0.0001	mg/kg-day	--	--	0.0062
	Nickel	0.022	mg/L	--	0.022	mg/L	M	6.1E-4	mg/kg-day	0.02	mg/kg-day	--	--	0.031
	Thallium	0.0029	mg/L	--	0.0029	mg/L	M	7.9E-5	mg/kg-day	0.00008	mg/kg-day	--	--	0.99
	Vanadium	0.025	mg/L	--	0.025	mg/L	M	6.8E-4	mg/kg-day	0.009	mg/kg-day	--	--	0.075
	Organic Analytes													
	Acetone	0.053	mg/L	--	0.053	mg/L	M	1.5E-3	mg/kg-day	0.9	mg/kg-day	--	--	0.0016
	Benzene	0.010	mg/L	--	0.010	mg/L	M	2.8E-4	mg/kg-day	0.004	mg/kg-day	--	--	0.070
	Chlorobenzene	0.0081	mg/L	--	0.0081	mg/L	M	2.2E-4	mg/kg-day	0.02	mg/kg-day	--	--	0.011
	Chloroethane	0.0063	mg/L	--	0.0063	mg/L	M	1.7E-4	mg/kg-day	0.4	mg/kg-day	--	--	0.00043
	1,2-Dichloroethene, isomers	0.0083	mg/L	--	0.0083	mg/L	M	2.3E-4	mg/kg-day	0.02	mg/kg-day	--	--	0.011
	1,4-Dichlorobenzene	0.0040	mg/L	--	0.0040	mg/L	M	1.1E-4	mg/kg-day	0.03	mg/kg-day	--	--	0.0037
	4-Methyl-2-pentanone	0.0072	mg/L	--	0.0072	mg/L	M	2.0E-4	mg/kg-day	0.08	mg/kg-day	--	--	0.0025
	4-Methylphenol	0.0094	mg/L	--	0.0094	mg/L	M	2.6E-4	mg/kg-day	0.005	mg/kg-day	--	--	0.052
	Toluene	0.27	mg/L	--	0.27	mg/L	M	7.4E-3	mg/kg-day	0.2	mg/kg-day	--	--	0.037
	Xylene	0.037	mg/L	--	0.037	mg/L	M	1.0E-3	mg/kg-day	0.2	mg/kg-day	--	--	0.0051
	PAHs													
	2-Methylnaphthalene	0.0010	mg/L	--	0.0010	mg/L	M	2.7E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0014
	Naphthalene	0.013	mg/L	--	0.013	mg/L	M	3.5E-4	mg/kg-day	0.02	mg/kg-day	--	--	0.018
	(Total)													5.5

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Resident
Receptor Age: Adult

Table 7.18.RME (Continued)
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	**Metals and Organometallic Analytes**													
Absorption	Arsenic	0.0078	mg/L	0.001	0.0078	mg/L	M	4.8E-7	mg/kg-day	0.0003	mg/kg-day	--	--	0.0016
	Barium	0.41	mg/L	0.001	0.41	mg/L	M	2.5E-5	mg/kg-day	0.0049	mg/kg-day	--	--	0.0051
	Cadmium	0.0013	mg/L	0.001	0.0013	mg/L	M	8.0E-8	mg/kg-day	0.000125	mg/kg-day	--	--	0.00064
	Copper	0.016	mg/L	0.001	0.016	mg/L	M	9.7E-7	mg/kg-day	0.0004	mg/kg-day	--	--	0.0024
	Iron	15.4	mg/L	0.001	15.4	mg/L	M	9.5E-4	mg/kg-day	0.30	mg/kg-day	--	--	0.0032
	Manganese	1.9	mg/L	0.001	1.9	mg/L	M	1.2E-4	mg/kg-day	0.0019	mg/kg-day	--	--	0.062
	Mercury (total)	0.0083	mg/L	0.001	0.0083	mg/L	M	5.1E-7	mg/kg-day	0.000021	mg/kg-day	--	--	0.024
	Methylmercury	0.000023	mg/L	0.001	0.000023	mg/L	M	1.4E-9	mg/kg-day	0.0001	mg/kg-day	--	--	0.000014
	Nickel	0.022	mg/L	0.0001	0.022	mg/L	M	1.4E-7	mg/kg-day	0.0008	mg/kg-day	--	--	0.00017
	Thallium	0.0029	mg/L	0.001	0.0029	mg/L	M	1.8E-7	mg/kg-day	0.00008	mg/kg-day	--	--	0.0022
	Vanadium	0.025	mg/L	0.001	0.025	mg/L	M	1.5E-6	mg/kg-day	0.00023	mg/kg-day	--	--	0.0065
	Organic Analytes													
	Acetone	0.053	mg/L	0.0014	0.053	mg/L	M	4.6E-6	mg/kg-day	0.9	mg/kg-day	--	--	0.0000051
	Benzene	0.010	mg/L	0.021	0.010	mg/L	M	1.3E-5	mg/kg-day	0.004	mg/kg-day	--	--	0.0033
	Chlorobenzene	0.0081	mg/L	0.041	0.0081	mg/L	M	2.0E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0010
	Chloroethane	0.0063	mg/L	0.0080	0.0063	mg/L	M	3.1E-6	mg/kg-day	0.4	mg/kg-day	--	--	0.0000078
	1,2-Dichloroethene, isomers	0.0083	mg/L	0.0013	0.0083	mg/L	M	6.7E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.000033
	1,4-Dichlorobenzene	0.0040	mg/L	0.062	0.0040	mg/L	M	1.5E-5	mg/kg-day	0.03	mg/kg-day	--	--	0.00051
	4-Methyl-2-pentanone	0.0072	mg/L	0.000036	0.0072	mg/L	M	6.4E-9	mg/kg-day	0.08	mg/kg-day	--	--	0.000000080
	4-Methylphenol	0.0094	mg/L	0.004	0.0094	mg/L	M	2.5E-6	mg/kg-day	0.005	mg/kg-day	--	--	0.00050
	Toluene	0.27	mg/L	0.045	0.27	mg/L	M	7.5E-4	mg/kg-day	0.2	mg/kg-day	--	--	0.0038
	Xylene	0.037	mg/L	0.081	0.037	mg/L	M	1.9E-4	mg/kg-day	0.2	mg/kg-day	--	--	0.00093
	PAHs													
	2-Methylnaphthalene	0.0010	mg/L	0.069	0.0010	mg/L	M	4.3E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00021
	Naphthalene	0.013	mg/L	0.069	0.013	mg/L	M	5.5E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0027
	(Total)													0.12
													Total Hazard Index Across All Exposure Routes/Pathways:	5.6

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Dermal permiability constants from U.S. EPA (1999a).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Indoor Air -Showering/Bathing
Receptor Population: Resident
Receptor Age: Adult

Table 7.19.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[b]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	**Organic Analytes**													
	Acetone	2.9	mg/m^3	--	2.9	mg/m^3	M	7.1E-2	mg/m^3	0.35	mg/m^3	--	--	0.20
	Benzene	0.56	mg/m^3	--	0.56	mg/m^3	M	1.4E-2	mg/m^3	0.03	mg/m^3	--	--	0.45
	Bis[2-ethylhexyl]phthalate	0.18	mg/m^3	--	0.18	mg/m^3	M	4.3E-3	mg/m^3	0.077	mg/m^3	--	--	0.055
	Chlorobenzene	0.19	mg/m^3	--	0.19	mg/m^3	M	4.6E-3	mg/m^3	0.06	mg/m^3	--	--	0.076
	Chloroethane	0.23	mg/m^3	--	0.23	mg/m^3	M	5.5E-3	mg/m^3	10	mg/m^3	--	--	0.00055
	1,4-Dichlorobenzene	0.12	mg/m^3	--	0.12	mg/m^3	M	2.8E-3	mg/m^3	0.8	mg/m^3	--	--	0.0036
	1,2-Dichloroethene, isomers	0.35	mg/m^3	--	0.35	mg/m^3	M	8.5E-3	mg/m^3	0.07	mg/m^3	--	--	0.12
	4-Methyl-2-pentanone	0.28	mg/m^3	--	0.28	mg/m^3	M	6.7E-3	mg/m^3	0.08	mg/m^3	--	--	0.084
	4-Methylphenol	0.38	mg/m^3	--	0.38	mg/m^3	M	9.2E-3	mg/m^3	0.018	mg/m^3	--	--	0.53
	Toluene	1.1	mg/m^3	--	1.1	mg/m^3	M	2.8E-2	mg/m^3	0.4	mg/m^3	--	--	0.069
	Xylenes	1.7	mg/m^3	--	1.7	mg/m^3	M	4.1E-2	mg/m^3	0.1	mg/m^3	--	--	0.41
	PAHs													
	Naphthalene	0.50	mg/m^3	--	0.50	mg/m^3	M	1.2E-2	mg/m^3	0.003	mg/m^3	--	--	4.0
	2-Methylnapthalene	0.029	mg/m^3	--	0.029	mg/m^3	M	7.1E-4	mg/m^3	0.003	mg/m^3	--	--	0.24
	(Total)													6.3
													Total Hazard Index Across All Exposure Routes/Pathways:	6.3

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Andelman Model as modified by Shaum et al (1994) and site groundwater data.
[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Resident
Receptor Age: Child

Table 7.20.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Arsenic	0.0078	mg/L	--	0.0078	mg/L	M	7.5E-4	mg/kg-day	0.0003	mg/kg-day	--	--	2.5
	Barium	0.41	mg/L	--	0.41	mg/L	M	3.9E-2	mg/kg-day	0.07	mg/kg-day	--	--	0.56
	Cadmium	0.0013	mg/L	--	0.0013	mg/L	M	1.2E-4	mg/kg-day	0.005	mg/kg-day	--	--	0.025
	Copper	0.016	mg/L	--	0.016	mg/L	M	1.5E-3	mg/kg-day	0.04	mg/kg-day	--	--	0.038
	Iron	15.4	mg/L	--	15.4	mg/L	M	1.5E+0	mg/kg-day	0.3	mg/kg-day	--	--	4.9
	Manganese	1.9	mg/L	--	1.9	mg/L	M	1.8E-1	mg/kg-day	0.047	mg/kg-day	--	--	3.8
	Mercury (total)	0.0083	mg/L	--	0.0083	mg/L	M	8.0E-4	mg/kg-day	0.0003	mg/kg-day	--	--	2.7
	Methylmercury	0.000023	mg/L	--	0.000023	mg/L	M	2.2E-6	mg/kg-day	0.0001	mg/kg-day	--	--	0.022
	Nickel	0.022	mg/L	--	0.022	mg/L	M	2.1E-3	mg/kg-day	0.02	mg/kg-day	--	--	0.11
	Thallium	0.0029	mg/L	--	0.0029	mg/L	M	2.8E-4	mg/kg-day	0.00008	mg/kg-day	--	--	3.5
	Vanadium	0.025	mg/L	--	0.025	mg/L	M	2.4E-3	mg/kg-day	0.009	mg/kg-day	--	--	0.26
	Organic Analytes													
	Acetone	0.053	mg/L	--	0.053	mg/L	M	5.1E-3	mg/kg-day	0.9	mg/kg-day	--	--	0.0057
	Benzene	0.010	mg/L	--	0.010	mg/L	M	9.8E-4	mg/kg-day	0.004	mg/kg-day	--	--	0.24
	Chlorobenzene	0.0081	mg/L	--	0.0081	mg/L	M	7.8E-4	mg/kg-day	0.02	mg/kg-day	--	--	0.039
	Chloroethane	0.0063	mg/L	--	0.0063	mg/L	M	6.0E-4	mg/kg-day	0.4	mg/kg-day	--	--	0.0015
	1,2-Dichloroethene, isomers	0.0083	mg/L	--	0.0083	mg/L	M	8.0E-4	mg/kg-day	0.02	mg/kg-day	--	--	0.040
	1,4-Dichlorobenzene	0.0040	mg/L	--	0.0040	mg/L	M	3.8E-4	mg/kg-day	0.03	mg/kg-day	--	--	0.013
	4-Methyl-2-pentanone	0.0072	mg/L	--	0.0072	mg/L	M	6.9E-4	mg/kg-day	0.08	mg/kg-day	--	--	0.0086
	4-Methylphenol	0.0094	mg/L	--	0.0094	mg/L	M	9.0E-4	mg/kg-day	0.005	mg/kg-day	--	--	0.18
	Toluene	0.27	mg/L	--	0.27	mg/L	M	2.6E-2	mg/kg-day	0.2	mg/kg-day	--	--	0.13
	Xylene	0.037	mg/L	--	0.037	mg/L	M	3.6E-3	mg/kg-day	0.2	mg/kg-day	--	--	0.018
	PAHs													
	2-Methylnaphthalene	0.0010	mg/L	--	0.0010	mg/L	M	9.6E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0048
	Naphthalene	0.013	mg/L	--	0.013	mg/L	M	1.2E-3	mg/kg-day	0.02	mg/kg-day	--	--	0.062
	(Total)													19

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Resident
Receptor Age: Child

Table 7.20.RME (Continued)
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	**Metals and Organometallic Analytes**													
Absorption	Arsenic	0.0078	mg/L	0.001	0.0078	mg/L	M	1.5E-6	mg/kg-day	0.0003	mg/kg-day	--	--	0.0049
	Barium	0.41	mg/L	0.001	0.41	mg/L	M	7.7E-5	mg/kg-day	0.0049	mg/kg-day	--	--	0.016
	Cadmium	0.0013	mg/L	0.001	0.0013	mg/L	M	2.5E-7	mg/kg-day	0.000125	mg/kg-day	--	--	0.0020
	Copper	0.016	mg/L	0.001	0.016	mg/L	M	3.0E-6	mg/kg-day	0.0004	mg/kg-day	--	--	0.0075
	Iron	15.4	mg/L	0.001	15.4	mg/L	M	2.9E-3	mg/kg-day	0.3	mg/kg-day	--	--	0.0097
	Manganese	1.9	mg/L	0.001	1.9	mg/L	M	3.5E-4	mg/kg-day	0.0019	mg/kg-day	--	--	0.19
	Mercury (total)	0.0083	mg/L	0.001	0.0083	mg/L	M	1.6E-6	mg/kg-day	0.000021	mg/kg-day	--	--	0.075
	Methylmercury	0.000023	mg/L	0.001	0.000023	mg/L	M	4.3E-9	mg/kg-day	0.0001	mg/kg-day	--	--	0.000043
	Nickel	0.022	mg/L	0.0001	0.022	mg/L	M	4.3E-7	mg/kg-day	0.0008	mg/kg-day	--	--	0.00053
	Thallium	0.0029	mg/L	0.001	0.0029	mg/L	M	5.5E-7	mg/kg-day	0.00008	mg/kg-day	--	--	0.0069
	Vanadium	0.025	mg/L	0.001	0.025	mg/L	M	4.7E-6	mg/kg-day	0.00023	mg/kg-day	--	--	0.020
	Organic Analytes													
	Acetone	0.053	mg/L	0.0014	0.053	mg/L	M	1.4E-5	mg/kg-day	0.9	mg/kg-day	--	--	0.000016
	Benzene	0.010	mg/L	0.021	0.010	mg/L	M	4.1E-5	mg/kg-day	0.004	mg/kg-day	--	--	0.010
	Chlorobenzene	0.0081	mg/L	0.041	0.0081	mg/L	M	6.3E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0032
	Chloroethane	0.0063	mg/L	0.0080	0.0063	mg/L	M	9.6E-6	mg/kg-day	0.4	mg/kg-day	--	--	0.000024
	1,2-Dichloroethene, isomers	0.0083	mg/L	0.0013	0.0083	mg/L	M	2.0E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00010
	1,4-Dichlorobenzene	0.0040	mg/L	0.062	0.0040	mg/L	M	4.7E-5	mg/kg-day	0.03	mg/kg-day	--	--	0.0016
	4-Methyl-2-pentanone	0.0072	mg/L	0.000036	0.0072	mg/L	M	4.9E-8	mg/kg-day	0.08	mg/kg-day	--	--	0.00000062
	4-Methylphenol	0.0094	mg/L	0.004	0.0094	mg/L	M	7.7E-6	mg/kg-day	0.005	mg/kg-day	--	--	0.0015
	Toluene	0.27	mg/L	0.045	0.27	mg/L	M	2.3E-3	mg/kg-day	0.2	mg/kg-day	--	--	0.012
	Xylene	0.037	mg/L	0.081	0.037	mg/L	M	5.7E-4	mg/kg-day	0.2	mg/kg-day	--	--	0.0029
	PAHs													
	2-Methylnaphthalene	0.0010	mg/L	0.069	0.0010	mg/L	M	1.3E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.00066
	Naphthalene	0.013	mg/L	0.069	0.013	mg/L	M	1.7E-4	mg/kg-day	0.02	mg/kg-day	--	--	0.0084
	(Total)													0.37
													Total Hazard Index Across All Exposure Routes/Pathways:	19

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Dermal permiability constants from U.S. EPA (1999a).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Indoor Air -Showering/Bathing
Receptor Population: Resident
Receptor Age: Child

Table 7.21.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[b]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	**Organic Analytes**													
	Acetone	5.2	mg/m^3	--	5.2	mg/m^3	M	2.2E-1	mg/m^3	0.35	mg/m^3	--	--	0.62
	Benzene	0.99	mg/m^3	--	0.99	mg/m^3	M	4.1E-2	mg/m^3	0.03	mg/m^3	--	--	1.4
	Bis[2-ethylhexyl]phthalate	0.31	mg/m^3	--	0.31	mg/m^3	M	1.3E-2	mg/m^3	0.077	mg/m^3	--	--	0.17
	Chlorobenzene	0.33	mg/m^3	--	0.33	mg/m^3	M	1.4E-2	mg/m^3	0.06	mg/m^3	--	--	0.23
	Chloroethane	0.41	mg/m^3	--	0.41	mg/m^3	M	1.7E-2	mg/m^3	10	mg/m^3	--	--	0.0017
	1,4-Dichlorobenzene	0.21	mg/m^3	--	0.21	mg/m^3	M	8.7E-3	mg/m^3	0.8	mg/m^3	--	--	0.011
	1,2-Dichloroethene, isomers	0.63	mg/m^3	--	0.63	mg/m^3	M	2.6E-2	mg/m^3	0.07	mg/m^3	--	--	0.37
	4-Methyl-2-pentanone	0.49	mg/m^3	--	0.49	mg/m^3	M	2.0E-2	mg/m^3	0.08	mg/m^3	--	--	0.26
	4-Methylphenol	0.68	mg/m^3	--	0.68	mg/m^3	M	2.8E-2	mg/m^3	0.018	mg/m^3	--	--	1.6
	Toluene	2.0	mg/m^3	--	2.0	mg/m^3	M	8.5E-2	mg/m^3	0.40	mg/m^3	--	--	0.21
	Xylenes	3.0	mg/m^3	--	3.0	mg/m^3	M	1.3E-1	mg/m^3	0.10	mg/m^3	--	--	1.3
	PAHs													
	Naphthalene	0.89	mg/m^3	--	0.89	mg/m^3	M	3.7E-2	mg/m^3	0.003	mg/m^3	--	--	12
	2-Methylnapthalene	0.052	mg/m^3	--	0.052	mg/m^3	M	2.2E-3	mg/m^3	0.003	mg/m^3	--	--	0.73
	(Total)													19
													Total Hazard Index Across All Exposure Routes/Pathways:	19

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Andelman Model as modified by Shaum et al (1994) and site groundwater data.
[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Current/Future
Medium: Air
Exposure Medium: Air
Exposure Point: Outdoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.1.RME
Calculation of Cancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	**Metals and Organometallic Analytes**											
	Mercury vapor	3.3E-5	mg/m^3	--	3.3E-5	mg/m^3	M	--	--	ND	--	--
											Total Risk:	0E+0
											Total Risk Across all Exposure Pathways:	0E+0

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Developed Area Indoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.2.RME
Calculation of Cancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[b]	Cancer Slope Factor Units	Cancer Risk
Inhalation	**Organic Analytes**											
	Benzene	1.3E-2	mg/m^3	--	1.3E-2	mg/m^3	M	5.3E-4	mg/kg-day	2.7E-2	$(mg/kg\text{-}day)^{-1}$	1E-5
	PAHs										--	
	2-Methylnaphthalene	1.2E-3	mg/m^3	--	1.2E-3	mg/m^3	M	--	--	ND	--	--
											Total Risk:	1E-5
											Total Risk Across all Exposure Pathways:	1E-5

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Johnson and Ettinger Model and site subsurface soil data.

[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Developed Area Indoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.3.RME
Calculation of Cancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[b]	Cancer Slope Factor Units	Cancer Risk
Inhalation	**Organic Analytes**											
	Acetone	3.6E-5	mg/m^3	--	3.6E-5	mg/m^3	M	--	--	ND	--	--
	Benzene	9.7E-5	mg/m^3	--	9.7E-5	mg/m^3	M	4.1E-6	mg/kg-day	2.7E-2	$(mg/kg\text{-}day)^{-1}$	1E-7
	Chlorobenzene	4.2E-5	mg/m^3	--	4.2E-5	mg/m^3	M	--	--	ND	--	--
	Chloroethane	3.1E-4	mg/m^3	--	3.1E-4	mg/m^3	M	1.3E-5	mg/kg-day	2.9E-3	$(mg/kg\text{-}day)^{-1}$	4E-8
	1,4-Dichlorobenzene	1.3E-5	mg/m^3	--	1.3E-5	mg/m^3	M	5.5E-7	mg/kg-day	2.2E-2	$(mg/kg\text{-}day)^{-1}$	1E-8
	1,2-Dichloroethene, isomers	8.7E-5	mg/m^3	--	8.7E-5	mg/m^3	M	--	--	ND	--	--
	4-Methyl-2-pentanone	6.3E-6	mg/m^3	--	6.3E-6	mg/m^3	M	--	--	ND	--	--
	Toluene	2.7E-3	mg/m^3	--	2.7E-3	mg/m^3	M	--	--	ND	--	--
	Xylenes	3.2E-4	mg/m^3	--	3.2E-4	mg/m^3	M	--	--	ND	--	--
	PAHs											
	Naphthalene	1.6E-5	mg/m^3	--	1.6E-5	mg/m^3	M	--	--	ND	--	--
	2-Methylnapthalene	1.1E-6	mg/m^3	--	1.1E-6	mg/m^3	M	--	--	ND	--	--
											Total Risk:	2E-7
											Total Risk Across all Exposure Pathways:	2E-7

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Johnson and Ettinger Model and site subsurface soil data.
[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b).

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Undeveloped Area Indoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.4.RME
Calculation of Cancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[b]	Cancer Slope Factor Units	Cancer Risk
Inhalation	**Organic Analytes**											
	Carbazole	6.1E-8	mg/m^3	--	6.1E-8	mg/m^3	M	2.5E-9	mg/kg-day	2.0E-2	$(mg/kg\text{-}day)^{-1}$	5E-11
	Toluene	2.6E-2	mg/m^3	--	2.6E-2	mg/m^3	M	--	--	ND	--	--
	Xylenes	4.0E-2	mg/m^3	--	4.0E-2	mg/m^3	M	--	--	ND	--	--
	PAHs											
	Benz[a]anthracene	1.4E-6	mg/m^3	--	1.4E-6	mg/m^3	M	6.1E-8	mg/kg-day	7.3E-1	$(mg/kg\text{-}day)^{-1}$	4E-8
	Benzo[a]pyrene	1.2E-6	mg/m^3	--	1.2E-6	mg/m^3	M	5.0E-8	mg/kg-day	7.3E+0	$(mg/kg\text{-}day)^{-1}$	4E-7
	Benzo[b]fluoranthene	1.6E-6	mg/m^3	--	1.6E-6	mg/m^3	M	6.6E-8	mg/kg-day	7.3E-1	$(mg/kg\text{-}day)^{-1}$	5E-8
	Benzo[ghi]perylene	5.2E-7	mg/m^3	--	5.2E-7	mg/m^3	M	--	--	ND	--	--
	Benzo[k]fluoranthene	4.6E-7	mg/m^3	--	4.6E-7	mg/m^3	M	1.9E-8	mg/kg-day	7.3E-2	$(mg/kg\text{-}day)^{-1}$	1E-9
	Dibenz[a,h]anthracene	1.6E-7	mg/m^3	--	1.6E-7	mg/m^3	M	6.9E-9	mg/kg-day	7.3E+0	$(mg/kg\text{-}day)^{-1}$	5E-8
	Indeno[1,2,3-cd]pyrene	5.4E-7	mg/m^3	--	5.4E-7	mg/m^3	M	2.3E-8	mg/kg-day	7.3E-1	$(mg/kg\text{-}day)^{-1}$	2E-8
	2-Methylnaphthalene	1.2E-3	mg/m^3	--	1.2E-3	mg/m^3	M	--	--	ND	--	--
	Naphthalene	3.0E-3	mg/m^3	--	3.0E-3	mg/m^3	M	--	--	ND	--	--
											Total Risk:	5E-7
											Total Risk Across all Exposure Pathways:	5E-7

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Johnson and Ettinger Model and site subsurface soil data.

[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Undeveloped Area Indoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.5.RME
Calculation of Cancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[b]	Cancer Slope Factor Units	Cancer Risk
Inhalation	**Organic Analytes**											
	Acetone	3.6E-5	mg/m^3	--	3.6E-5	mg/m^3	M	--	--	ND	--	--
	Benzene	9.7E-5	mg/m^3	--	9.7E-5	mg/m^3	M	4.1E-6	mg/kg-day	2.7E-2	$(mg/kg\text{-}day)^{-1}$	1E-7
	Chlorobenzene	4.2E-5	mg/m^3	--	4.2E-5	mg/m^3	M	--	--	ND	--	--
	Chloroethane	3.1E-4	mg/m^3	--	3.1E-4	mg/m^3	M	1.3E-5	mg/kg-day	2.9E-3	$(mg/kg\text{-}day)^{-1}$	4E-8
	1,4-Dichlorobenzene	1.3E-5	mg/m^3	--	1.3E-5	mg/m^3	M	5.5E-7	mg/kg-day	2.2E-2	$(mg/kg\text{-}day)^{-1}$	1E-8
	1,2-Dichloroethene, isomers	8.7E-5	mg/m^3	--	8.7E-5	mg/m^3	M	--	--	ND	--	--
	4-Methyl-2-pentanone	6.3E-6	mg/m^3	--	6.3E-6	mg/m^3	M	--	--	ND	--	--
	Toluene	2.7E-3	mg/m^3	--	2.7E-3	mg/m^3	M	--	--	ND	--	--
	Xylenes	3.2E-4	mg/m^3	--	3.2E-4	mg/m^3	M	--	--	ND	--	--
	PAHs											
	Naphthalene	1.6E-5	mg/m^3	--	1.6E-5	mg/m^3	M	--	--	ND	--	--
	2-Methylnapthalene	1.1E-6	mg/m^3	--	1.1E-6	mg/m^3	M	--	--	ND	--	--
											Total Risk:	2E-7
											Total Risk Across all Exposure Pathways:	2E-7

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Johnson and Ettinger Model and site subsurface soil data.
[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b).

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Developed Area Surface Soil (unpaved)
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.6.RME
Calculation of Cancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Aluminum	12000	mg/kg	--	12000	mg/kg	M	--	--	ND	--	--
	Arsenic	11	mg/kg	--	11	mg/kg	M	1.9E-6	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-6
	Chromium	97	mg/kg	--	97	mg/kg	M	--	--	ND	--	--
	Copper	470	mg/kg	--	470	mg/kg	M	--	--	ND	--	--
	Iron	23000	mg/kg	--	23000	mg/kg	M	--	--	ND	--	--
	Manganese	540	mg/kg	--	540	mg/kg	M	--	--	ND	--	--
	Mercury (total)	310	mg/kg	--	310	mg/kg	M	--	--	ND	--	--
	Vanadium	140	mg/kg	--	140	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	PAHs											
	Benzo[a]pyrene	0.41	mg/kg	--	0.41	mg/kg	M	7.2E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	5E-7
	Benzo[b]fluoranthene	0.75	mg/kg	--	0.75	mg/kg	M	1.3E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-7
	Dibenz[a,h]anthracene	0.071	mg/kg	--	0.071	mg/kg	M	1.2E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	9E-8
	(Total)										Total Risk:	4E-6
Dermal Absorption	**Metals and Organometallic Analytes**											
	Arsenic	11	mg/kg	0.03	11	mg/kg	M	7.6E-7	mg/kg-day	1.5E+0	(mg/kg-day)-1	1E-6
	Organic Analytes											
	PAHs											
	Benzo[a]pyrene	0.41	mg/kg	0.13	0.41	mg/kg	M	1.2E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	9E-7
	Benzo[b]fluoranthene	0.75	mg/kg	0.13	0.75	mg/kg	M	2.2E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-7
	Dibenz[a,h]anthracene	0.071	mg/kg	0.13	0.071	mg/kg	M	2.1E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-7
	(Total)										Total Risk:	2E-6
											Total Risk Across all Exposure Pathways:	6E-6

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit
ND - not determined by EPA or not considered to be a carcinogen

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Developed Area Surface Soil (all)
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.7.RME
Calculation of Cancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Commercial Worker Surface Soil Ingestion/Dermal Absorption

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Aluminum	12000	mg/kg	--	12000	mg/kg	M	--	--	ND	--	--
	Arsenic	11	mg/kg	--	11	mg/kg	M	1.9E-6	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-6
	Chromium	76	mg/kg	--	76	mg/kg	M	--	--	ND	--	--
	Copper	689	mg/kg	--	689	mg/kg	M	--	--	ND	--	--
	Iron	21574	mg/kg	--	21574	mg/kg	M	--	--	ND	--	--
	Manganese	399	mg/kg	--	399	mg/kg	M	--	--	ND	--	--
	Mercury (total)	2250	mg/kg	--	2250	mg/kg	M	--	--	ND	--	--
	Thallium	2.4	mg/kg	--	2.4	mg/kg	M	--	--	ND	--	--
	Vanadium	140	mg/kg	--	140	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Benzene	0.3	mg/kg	--	0.3	mg/kg	M	5.1E-8	mg/kg-day	5.5E-2	(mg/kg-day)-1	3E-9
	PAHs											
	Benz[a]anthracene	0.85	mg/kg	--	0.85	mg/kg	M	1.5E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-7
	Benzo[a]pyrene	0.68	mg/kg	--	0.68	mg/kg	M	1.2E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	9E-7
	Benzo[b]fluoranthene	1.1	mg/kg	--	1.1	mg/kg	M	1.8E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-7
	Dibenz[a,h]anthracene	0.15	mg/kg	--	0.15	mg/kg	M	2.6E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-7
	(Total)											4E-6
Dermal Absorption	**Metals and Organometallic Analytes**											
	Arsenic	11	mg/kg	0.03	11	mg/kg	M	7.6E-7	mg/kg-day	1.5E+0	(mg/kg-day)-1	1E-6
	Organic Analytes											
	PAHs											
	Benz[a]anthracene	0.85	mg/kg	0.13	0.85	mg/kg	M	2.6E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-7
	Benzo[a]pyrene	0.68	mg/kg	0.13	0.68	mg/kg	M	2.0E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	1E-6
	Benzo[b]fluoranthene	1.1	mg/kg	0.13	1.1	mg/kg	M	3.2E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-7
	Dibenz[a,h]anthracene	0.15	mg/kg	0.13	0.15	mg/kg	M	4.5E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	3E-7
	(Total)											3E-6
											Total Risk Across all Exposure Pathways:	8E-6

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit
ND - not determined by EPA or not considered to be a carcinogen

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Developed Area Subsurface Soil (1-20 ft)
Receptor Population: Construction Worker
Receptor Age: Adult

Table 8.8.RME
Calculation of Noncancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Construction Worker Subsurface Soil Ingestion/Dermal Absorption

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Arsenic	9.9	mg/kg	--	9.9	mg/kg	M	3.3E-8	mg/kg-day	1.5E+0	(mg/kg-day)-1	5E-8
	Barium	818	mg/kg	--	818	mg/kg	M	--	--	ND	--	--
	Chromium	131	mg/kg	--	131	mg/kg	M	--	--	ND	--	--
	Copper	7420	mg/kg	--	7420	mg/kg	M	--	--	ND	--	--
	Iron	35400	mg/kg	--	35400	mg/kg	M	--	--	ND	--	--
	Manganese	812	mg/kg	--	812	mg/kg	M	--	--	ND	--	--
	Mercury (total)	1269	mg/kg	--	1269	mg/kg	M	--	--	ND	--	--
	Thallium	5.4	mg/kg	--	5.4	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Benzene	2.8	mg/kg	--	2.8	mg/kg	M	9.4E-9	mg/kg-day	5.5E-2	(mg/kg-day)-1	5E-10
	PAHs											
	2-Methylnaphthalene	0.45	mg/kg	--	0	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	0.36	mg/kg	--	0.36	mg/kg	M	1.2E-9	mg/kg-day	2.0E+0	(mg/kg-day)-1	2E-9
	(Total)											5E-8
Dermal Absorption	**Metals and Organometallic Analytes**											
	Arsenic	9.9	mg/kg	0.03	9.9	mg/kg	M	1.3E-08	mg/kg-day	1.5E+0	(mg/kg-day)-1	2E-8
	Organic Analytes											
	PAHs											
	2-Methylnaphthalene	0.45	mg/kg	0.13	0	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	0.36	mg/kg	0.14	0.36	mg/kg	M	2.2E-09	mg/kg-day	2.0E+0	(mg/kg-day)-1	4E-9
	(Total)											2E-8
											Total Risk Across all Exposure Pathways:	8E-8

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit
ND - not determined by EPA or not considered to be a carcinogen

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Undeveloped Area Surface Soil
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.9.RME
Calculation of Cancer Risks
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Aluminum	6157	mg/kg	--	6157	mg/kg	M	--	--	ND	--	--
	Antimony	12.7	mg/kg	--	12.7	mg/kg	M	--	--	ND	--	--
	Arsenic	9.6	mg/kg	--	9.6	mg/kg	M	1.7E-6	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-6
	Barium	1530	mg/kg	--	1530	mg/kg	M	--	--	ND	--	--
	Cadmium	14.9	mg/kg	--	14.9	mg/kg	M	--	--	ND	--	--
	Chromium	390	mg/kg	--	390	mg/kg	M	--	--	ND	--	--
	Copper	587	mg/kg	--	587	mg/kg	M	--	--	ND	--	--
	Iron	34588	mg/kg	--	34588	mg/kg	M	--	--	ND	--	--
	Manganese	679	mg/kg	--	679	mg/kg	M	--	--	ND	--	--
	Mercury (total)	507	mg/kg	--	507	mg/kg	M	--	--	ND	--	--
	Methylmercury	0.32	mg/kg	--	0.32	mg/kg	M	--	--	ND	--	--
	Nickel	51.1	mg/kg	--	51.1	mg/kg	M	--	--	ND	--	--
	Silver	22.1	mg/kg	--	22.1	mg/kg	M	--	--	ND	--	--
	Thallium	4.2	mg/kg	--	4.2	mg/kg	M	--	--	ND	--	--
	Vanadium	73.1	mg/kg	--	73.1	mg/kg	M	--	--	ND	--	--
	Zinc	18443	mg/kg	--	18443	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Bis[2-ethylhexyl]phthalate	49	mg/kg	--	49	mg/kg	M	8.5E-6	mg/kg-day	1.4E-2	(mg/kg-day)-1	1E-7
	PAHs											
	Benz[a]anthracene	2.4	mg/kg	--	2.4	mg/kg	M	4.2E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	3E-7
	Benzo[a]pyrene	2.8	mg/kg	--	2.8	mg/kg	M	4.9E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	4E-6
	Benzo[b]fluoranthene	3.2	mg/kg	--	3.2	mg/kg	M	5.6E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	4E-7
	Dibenz[a,h]anthracene	0.90	mg/kg	--	0.90	mg/kg	M	1.6E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	1E-6
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	--	1.7	mg/kg	M	3.0E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-7
	Naphthalene	5.1	mg/kg	--	5.1	mg/kg	M	--	--	ND	--	--
	2-Methylnaphthalene	2.5	mg/kg	--	2.5	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	4.4	mg/kg	--	4.4	mg/kg	M	7.7E-7	mg/kg-day	2.0E+0	(mg/kg-day)-1	2E-6
	(Total)											1E-5
Dermal Absorption	**Metals and Organometallic Analytes**											
	Arsenic	9.6	mg/kg	0.03	9.6	mg/kg	M	6.6E-07	mg/kg-day	1.5E+0	(mg/kg-day)-1	1E-6
	Cadmium	14.9	mg/kg	0.001	14.9	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Bis[2-ethylhexyl]phthalate	49	mg/kg	0.1	49	mg/kg	M	1.1E-05	mg/kg-day	1.4E-2	(mg/kg-day)-1	2E-7
	PAHs											
	Benz[a]anthracene	2.4	mg/kg	0.13	2.4	mg/kg	M	7.2E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	5E-7
	Benzo[a]pyrene	2.8	mg/kg	0.13	2.8	mg/kg	M	8.5E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	6E-6
	Benzo[b]fluoranthene	3.2	mg/kg	0.13	3.2	mg/kg	M	9.5E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	7E-7
	Dibenz[a,h]anthracene	0.90	mg/kg	0.13	0.90	mg/kg	M	2.7E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-6
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	0.13	1.72	mg/kg	M	5.1E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	4E-7
	Naphthalene	5.1	mg/kg	0.13	5.1	mg/kg	M	--	--	ND	--	--
	2-Methylnaphthalene	2.5	mg/kg	0.13	2.5	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	4.4	mg/kg	0.14	4.4	mg/kg	M	1.4E-6	mg/kg-day	2.0E+0	(mg/kg-day)-1	3E-6
	(Total)											1E-5
									Total Risk Across all Exposure Pathways:			2E-5

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Undeveloped Area Surface Sediment
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Table 8.10.RME
Calculation of Cancer Risks
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Aluminum	13900	mg/kg	--	13900	mg/kg	M	--	--	ND	--	--
	Arsenic	8.8	mg/kg	--	8.8	mg/kg	M	1.9E-6	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-6
	Cadmium	9.1	mg/kg	--	9.1	mg/kg	M	--	--	ND	--	--
	Chromium	156	mg/kg	--	156	mg/kg	M	--	--	ND	--	--
	Iron	21400	mg/kg	--	21400	mg/kg	M	--	--	ND	--	--
	Mercury (total)	1290	mg/kg	--	1290	mg/kg	M	--	--	ND	--	--
	Methylmercury	0.13	mg/kg	--	0.13	mg/kg	M	--	--	ND	--	--
	Thallium	4.8	mg/kg	--	4.8	mg/kg	M	--	--	ND	--	--
	Vanadium	69	mg/kg	--	69	mg/kg	M	--	--	ND	--	--
	Zinc	3540	mg/kg	--	3540	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	PAHs											
	Benz[a]anthracene	1.7	mg/kg	--	1.7	mg/kg	M	3.8E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	3E-7
	Benzo[a]pyrene	1.6	mg/kg	--	1.6	mg/kg	M	3.5E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	3E-6
	Benzo[b]fluoranthene	1.8	mg/kg	--	1.8	mg/kg	M	4.0E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	3E-7
	Dibenz[a,h]anthracene	0.32	mg/kg	--	0.32	mg/kg	M	7.1E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	5E-7
	Indeno[1,2,3-cd]pyrene	1.2	mg/kg	--	1.2	mg/kg	M	2.7E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-7
	PCBs (Total)	0.73	mg/kg	--	0.73	mg/kg	M	1.6E-7	mg/kg-day	2.0E+0	(mg/kg-day)-1	3E-7
	(Total)											7E-6
Dermal	**Metals and Organometallic Analytes**											
Absorption	Arsenic	8.8	mg/kg	0.03	8.8	mg/kg	M	2.3E-07	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-7
	Cadmium	9.1	mg/kg	0.001	9.1	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	PAHs											
	Benz[a]anthracene	1.7	mg/kg	0.13	1.7	mg/kg	M	2.0E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-7
	Benzo[a]pyrene	1.6	mg/kg	0.13	1.6	mg/kg	M	1.8E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	1E-6
	Benzo[b]fluoranthene	1.8	mg/kg	0.13	1.8	mg/kg	M	2.1E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-7
	Dibenz[a,h]anthracene	0.32	mg/kg	0.13	0.32	mg/kg	M	3.7E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	3E-7
	Indeno[1,2,3-cd]pyrene	1.2	mg/kg	0.13	1.2	mg/kg	M	1.4E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-7
	PCBs (Total)	0.73	mg/kg	0.14	0.73	mg/kg	M	9.0E-8	mg/kg-day	2.0E+0	(mg/kg-day)-1	2E-7
	(Total)											3E-6
											Total Risk Across all Exposure Pathways:	1E-5

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Undeveloped Area Surface Sediment
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent/Pre-Adolescent

Table 8.11.RME
Calculation of Cancer Risks
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Aluminum	13900	mg/kg	--	13900	mg/kg	M	--	--	ND	--	--
	Arsenic	8.8	mg/kg	--	8.8	mg/kg	M	8.4E-7	mg/kg-day	1.5E+0	(mg/kg-day)-1	1E-6
	Cadmium	9.1	mg/kg	--	9.1	mg/kg	M	--	--	ND	--	--
	Chromium	156	mg/kg	--	156	mg/kg	M	--	--	ND	--	--
	Iron	21400	mg/kg	--	21400	mg/kg	M	--	--	ND	--	--
	Mercury (total)	1290	mg/kg	--	1290	mg/kg	M	--	--	ND	--	--
	Methylmercury	0.13	mg/kg	--	0.13	mg/kg	M	--	--	ND	--	--
	Thallium	4.8	mg/kg	--	4.8	mg/kg	M	--	--	ND	--	--
	Vanadium	69.4	mg/kg	--	69.4	mg/kg	M	--	--	ND	--	--
	Zinc	14.0	mg/kg	--	14.0	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	PAHs											
	Benz[a]anthracene	1.7	mg/kg	--	1.7	mg/kg	M	1.6E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-7
	Benzo[a]pyrene	1.6	mg/kg	--	1.6	mg/kg	M	1.5E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	1E-6
	Benzo[b]fluoranthene	1.8	mg/kg	--	1.8	mg/kg	M	1.7E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-7
	Dibenz[a,h]anthracene	0.32	mg/kg	--	0.32	mg/kg	M	3.0E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-7
	Indeno[1,2,3-cd]pyrene	1.2	mg/kg	--	1.2	mg/kg	M	1.1E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	8E-8
	PCBs (Total)	0.73	mg/kg	--	0.73	mg/kg	M	6.9E-8	mg/kg-day	2.0E+0	(mg/kg-day)-1	1E-7
	(Total)											3E-6
Dermal	**Metals and Organometallic Analytes**											
Absorption	Arsenic	8.8	mg/kg	0.03	8.8	mg/kg	M	2.0E-07	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-7
	Cadmium	9.1	mg/kg	0.001	9.1	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	PAHs											
	Benz[a]anthracene	1.7	mg/kg	0.13	1.7	mg/kg	M	1.7E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-7
	Benzo[a]pyrene	1.6	mg/kg	0.13	1.6	mg/kg	M	1.6E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	1E-6
	Benzo[b]fluoranthene	1.8	mg/kg	0.13	1.8	mg/kg	M	1.8E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-7
	Dibenz[a,h]anthracene	0.32	mg/kg	0.13	0.32	mg/kg	M	3.2E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-7
	Indeno[1,2,3-cd]pyrene	1.2	mg/kg	0.13	1.2	mg/kg	M	1.2E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	9E-8
	PCBs (Total)	0.73	mg/kg	0.14	0.73	mg/kg	M	7.8E-8	mg/kg-day	2.0E+0	(mg/kg-day)-1	2E-7
	(Total)											2E-6
											Total Risk Across all Exposure Pathways:	5E-6

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen

PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Undeveloped Area Surface Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Table 8.12.RME
Calculation of Cancer Risks
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Aluminum	6157	mg/kg	--	6157	mg/kg	M	--	--	ND	--	--
	Antimony	12.7	mg/kg	--	12.7	mg/kg	M	--	--	ND	--	--
	Arsenic	9.6	mg/kg	--	9.6	mg/kg	M	2.1E-6	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-6
	Barium	1530	mg/kg	--	1530	mg/kg	M	--	--	ND	--	--
	Cadmium	14.9	mg/kg	--	14.9	mg/kg	M	--	--	ND	--	--
	Chromium	390	mg/kg	--	390	mg/kg	M	--	--	ND	--	--
	Copper	587	mg/kg	--	587	mg/kg	M	--	--	ND	--	--
	Iron	34588	mg/kg	--	34588	mg/kg	M	--	--	ND	--	--
	Manganese	679	mg/kg	--	679	mg/kg	M	--	--	ND	--	--
	Mercury (total)	507	mg/kg	--	507	mg/kg	M	--	--	ND	--	--
	Methylmercury	0.32	mg/kg	--	0.32	mg/kg	M	--	--	ND	--	--
	Nickel	51.1	mg/kg	--	51.1	mg/kg	M	--	--	ND	--	--
	Silver	22.1	mg/kg	--	22.1	mg/kg	M	--	--	ND	--	--
	Thallium	4.2	mg/kg	--	4.2	mg/kg	M	--	--	ND	--	--
	Vanadium	73.1	mg/kg	--	73.1	mg/kg	M	--	--	ND	--	--
	Zinc	18443	mg/kg	--	18443	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Bis[2-ethylhexyl]phthalate	49	mg/kg	--	49	mg/kg	M	1.1E-5	mg/kg-day	1.4E-2	(mg/kg-day)-1	2E-7
	PAHs											
	Benz[a]anthracene	2.4	mg/kg	--	2.4	mg/kg	M	5.3E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	4E-7
	Benzo[a]pyrene	2.8	mg/kg	--	2.8	mg/kg	M	6.3E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	5E-6
	Benzo[b]fluoranthene	3.2	mg/kg	--	3.2	mg/kg	M	7.0E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	5E-7
	Dibenz[a,h]anthracene	0.90	mg/kg	--	0.90	mg/kg	M	2.0E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	1E-6
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	--	1.7	mg/kg	M	3.8E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	3E-7
	Naphthalene	5.1	mg/kg	--	5.1	mg/kg	M	--	--	ND	--	--
	2-Methylnaphthalene	2.5	mg/kg	--	2.5	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	4.4	mg/kg	--	4.4	mg/kg	M	9.7E-7	mg/kg-day	2.0E+0	(mg/kg-day)-1	2E-6
	(Total)											1E-5
Dermal Absorption	**Metals and Organometallic Analytes**											
	Arsenic	9.6	mg/kg	0.03	9.6	mg/kg	M	2.5E-07	mg/kg-day	1.5E+0	(mg/kg-day)-1	4E-7
	Cadmium	14.9	mg/kg	0.001	14.9	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Bis[2-ethylhexyl]phthalate	49	mg/kg	0.10	49	mg/kg	M	4.3E-6	mg/kg-day	1.4E-2	(mg/kg-day)-1	6E-8
	PAHs											
	Benz[a]anthracene	2.4	mg/kg	0.13	2.4	mg/kg	M	2.8E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-7
	Benzo[a]pyrene	2.8	mg/kg	0.13	2.8	mg/kg	M	3.2E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-6
	Benzo[b]fluoranthene	3.2	mg/kg	0.13	3.2	mg/kg	M	3.7E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	3E-7
	Dibenz[a,h]anthracene	0.90	mg/kg	0.13	0.90	mg/kg	M	1.0E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	8E-7
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	0.13	1.7	mg/kg	M	2.0E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-7
	Naphthalene	5.1	mg/kg	0.13	5.1	mg/kg	M	--	--	ND	--	--
	2-Methylnaphthalene	2.5	mg/kg	0.13	2.5	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	4.4	mg/kg	0.1	4.4	mg/kg	M	5.4E-07	mg/kg-day	2.0E+0	(mg/kg-day)-1	1E-6
	(Total)											5E-6
											Total Risk Across all Exposure Pathways:	2E-5

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen

PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Undeveloped Area Surface Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent/Pre-Adolescent

Table 8.13.RME
Calculation of Cancer Risks
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Aluminum	6157	mg/kg	--	6157	mg/kg	M	--	--	ND	--	--
	Antimony	12.7	mg/kg	--	12.7	mg/kg	M	--	--	ND	--	--
	Arsenic	9.6	mg/kg	--	9.6	mg/kg	M	9.1E-7	mg/kg-day	1.5E+0	(mg/kg-day)-1	1E-6
	Barium	1530	mg/kg	--	1530	mg/kg	M	--	--	ND	--	--
	Cadmium	14.9	mg/kg	--	14.9	mg/kg	M	--	--	ND	--	--
	Chromium	390	mg/kg	--	390	mg/kg	M	--	--	ND	--	--
	Copper	587	mg/kg	--	587	mg/kg	M	--	--	ND	--	--
	Iron	34588	mg/kg	--	34588	mg/kg	M	--	--	ND	--	--
	Manganese	679	mg/kg	--	679	mg/kg	M	--	--	ND	--	--
	Mercury (total)	507	mg/kg	--	507	mg/kg	M	--	--	ND	--	--
	Methylmercury	0.32	mg/kg	--	0.32	mg/kg	M	--	--	ND	--	--
	Nickel	51.1	mg/kg	--	51.1	mg/kg	M	--	--	ND	--	--
	Silver	22.1	mg/kg	--	22.1	mg/kg	M	--	--	ND	--	--
	Thallium	4.2	mg/kg	--	4.2	mg/kg	M	--	--	ND	--	--
	Vanadium	73.1	mg/kg	--	73.1	mg/kg	M	--	--	ND	--	--
	Zinc	18443	mg/kg	--	18443.0	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Bis[2-ethylhexyl]phthalate	49	mg/kg	--	49	mg/kg	M	4.6E-6	--	1.4E-2	--	6E-8
	PAHs											
	Benz[a]anthracene	2.4	mg/kg	--	2.4	mg/kg	M	2.3E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-7
	Benzo[a]pyrene	2.8	mg/kg	--	2.8	mg/kg	M	2.7E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-6
	Benzo[b]fluoranthene	3.2	mg/kg	--	3.2	mg/kg	M	3.0E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-7
	Dibenz[a,h]anthracene	0.90	mg/kg	--	0.90	mg/kg	M	8.5E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	6E-7
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	--	1.7	mg/kg	M	1.6E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-7
	Naphthalene	5.1	mg/kg	--	5.1	mg/kg	M	--	--	ND	--	--
	2-Methylnaphthalene	2.5	mg/kg	--	2.5	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	4.4	mg/kg	--	4.4	mg/kg	M	4.2E-7	mg/kg-day	2.0E+0	(mg/kg-day)-1	8E-7
	(Total)											5E-6
Dermal Absorption	**Metals and Organometallic Analytes**											
	Arsenic	9.6	mg/kg	0.03	9.6	mg/kg	M	2.2E-07	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-7
	Cadmium	14.9	mg/kg	0.001	14.9	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Bis[2-ethylhexyl]phthalate	49	mg/kg	0.10	49	mg/kg	M	3.7E-6	mg/kg-day	1.4E-2	(mg/kg-day)-1	5E-8
	PAHs											
	Benz[a]anthracene	2.4	mg/kg	0.13	2.4	mg/kg	M	2.4E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-7
	Benzo[a]pyrene	2.8	mg/kg	0.13	2.8	mg/kg	M	2.8E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-6
	Benzo[b]fluoranthene	3.2	mg/kg	0.13	3.2	mg/kg	M	3.1E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-7
	Dibenz[a,h]anthracene	0.90	mg/kg	0.13	0.90	mg/kg	M	8.9E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	6E-7
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	0.13	1.7	mg/kg	M	1.7E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-7
	Naphthalene	5.1	mg/kg	0.13	5.1	mg/kg	M	--	--	ND	--	--
	2-Methylnaphthalene	2.5	mg/kg	0.13	2.5	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	4.4	mg/kg	0.14	4.4	mg/kg	M	4.7E-7	mg/kg-day	2.0E+0	(mg/kg-day)-1	9E-7
	(Total)											5E-6
											Total Risk Across all Exposure Pathways:	1E-5

Note:
-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen

PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Undeveloped Area Subsurface Soil (1-20 ft.)
Receptor Population: Construction Worker
Receptor Age: Adult

Table 8.14.RME
Calculation of Cancer Risks
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Aluminum	13615	mg/kg	--	13615	mg/kg	M	--	--	ND	--	--
	Antimony	14.5	mg/kg	--	14.5	mg/kg	M	--	--	ND	--	--
	Arsenic	22.0	mg/kg	--	22.0	mg/kg	M	7.4E-8	mg/kg-day	1.5E+0	(mg/kg-day)-1	1E-7
	Barium	1172	mg/kg	--	1172	mg/kg	M	--	--	ND	--	--
	Cadmium	12.1	mg/kg	--	12.1	mg/kg	M	--	--	ND	--	--
	Chromium	308	mg/kg	--	308	mg/kg	M	--	--	ND	--	--
	Copper	956	mg/kg	--	956	mg/kg	M	--	--	ND	--	--
	Iron	75160	mg/kg	--	75160	mg/kg	M	--	--	ND	--	--
	Manganese	811	mg/kg	--	811	mg/kg	M	--	--	ND	--	--
	Mercury (total)	736	mg/kg	--	736	mg/kg	M	--	--	ND	--	--
	Methylmercury	0.0074	mg/kg	--	0.0074	mg/kg	M	--	--	ND	--	--
	Nickel	82	mg/kg	--	82	mg/kg	M	--	--	ND	--	--
	Selenium	4.5	mg/kg	--	4.5	mg/kg	M	--	--	ND	--	--
	Silver	37	mg/kg	--	37	mg/kg	M	--	--	ND	--	--
	Thallium	2.6	mg/kg	--	2.6	mg/kg	M	--	--	ND	--	--
	Vanadium	127	mg/kg	--	127	mg/kg	M	--	--	ND	--	--
	Zinc	4687	mg/kg	--	4687.0	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Carbazole	0.89	mg/kg	--	0.89	mg/kg	M	3.0E-9	mg/kg-day	2.0E-2	(mg/kg-day)-1	6E-11
	Toluene	7.3	mg/kg	--	7.3	mg/kg	M	--	--	ND	--	--
	Xylenes	11.3	mg/kg	--	11.3	mg/kg	M	--	--	ND	--	--
	PAHs											
	2-Methylnaphthalene	0.45	mg/kg	--	0.45	mg/kg	M	--	--	ND	--	--
	Benz[a]anthracene	2.3	mg/kg	--	2.3	mg/kg	M	7.7E-9	mg/kg-day	7.3E-1	(mg/kg-day)-1	6E-9
	Benzo[a]pyrene	1.9	mg/kg	--	1.9	mg/kg	M	6.4E-9	mg/kg-day	7.3E+0	(mg/kg-day)-1	5E-8
	Benzo[b]fluoranthene	2.5	mg/kg	--	2.5	mg/kg	M	8.4E-9	mg/kg-day	7.3E-1	(mg/kg-day)-1	6E-9
	Benzo[ghi]perylene	0.83	mg/kg	--	0.83	mg/kg	M	--	--	ND	--	--
	Benzo[k]fluoranthene	0.74	mg/kg	--	0.74	mg/kg	M	2.5E-9	mg/kg-day	7.3E-2	(mg/kg-day)-1	2E-10
	Dibenz[a,h]anthracene	0.26	mg/kg	--	0.26	mg/kg	M	8.8E-10	mg/kg-day	7.3E+0	(mg/kg-day)-1	6E-9
	Indeno[1,2,3-cd]pyrene	0.86	mg/kg	--	0.86	mg/kg	M	2.9E-9	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-9
	Naphthalene	0.85	mg/kg	--	0.85	mg/kg	M	--	--	ND	--	--
	PCBs (as Aroclor 1254)	4.4	mg/kg	--	4.4	mg/kg	M	1.5E-8	mg/kg-day	2.0E+0	(mg/kg-day)-1	3E-8
	(Total)											2E-07

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Undeveloped Area Subsurface Soil (1-20 ft.)
Receptor Population: Construction Worker
Receptor Age: Adult

Table 8.14.RME (continued)
Calculation of Cancer Risks
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Dermal Absorption	**Metals and Organometallic Analytes**											
	Arsenic	22.0	mg/kg	0.03	22.0	mg/kg	M	2.9E-8	mg/kg-day	1.5E+0	(mg/kg-day)-1	4E-08
	Cadmium	12.1	mg/kg	0.001	12.1	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Carbazole	0.89	mg/kg	0.10	0.89	mg/kg	M	3.9E-9	mg/kg-day	2.0E-2	(mg/kg-day)-1	8E-11
	PAHs											
	2-Methylnaphthalene	0.45	mg/kg	0.13	0.45	mg/kg	M	--	--	ND	--	--
	Benz[a]anthracene	2.3	mg/kg	0.13	2.3	mg/kg	M	1.3E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-8
	Benzo[a]pyrene	1.9	mg/kg	0.13	1.9	mg/kg	M	1.1E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	8E-8
	Benzo[b]fluoranthene	2.5	mg/kg	0.13	2.5	mg/kg	M	1.4E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-8
	Benzo[ghi]perylene	0.83	mg/kg	0.13	0.83	mg/kg	M	--	--	ND	--	--
	Benzo[k]fluoranthene	0.74	mg/kg	0.13	0.74	mg/kg	M	4.2E-9	mg/kg-day	7.3E-2	(mg/kg-day)-1	3E-10
	Dibenz[a,h]anthracene	0.26	mg/kg	0.13	0.26	mg/kg	M	1.5E-9	mg/kg-day	7.3E+0	(mg/kg-day)-1	1E-8
	Indeno[1,2,3-cd]pyrene	0.86	mg/kg	0.13	0.86	mg/kg	M	5.0E-9	mg/kg-day	7.3E-1	(mg/kg-day)-1	4E-9
	Naphthalene	0.85	mg/kg	0.13	0.8	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	4.4	mg/kg	0.14	4.4	mg/kg	M	2.7E-8	mg/kg-day	2.0E+0	(mg/kg-day)-1	5E-8
	(Total)											2E-7
											Total Risk Across all Exposure Pathways:	4E-7

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001). Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Undeveloped Area Surface Water
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Table 8.15.RME
Calculation of Cancer Risks
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Iron	2.6	mg/L	--	2.6	mg/L	M	--	--	ND	--	--
	Manganese	0.41	mg/L	--	0.41	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.018	mg/L	--	0.018	mg/L	M	--	--	ND	--	--
	Methylmercury	2.8E-6	mg/L	--	2.8E-6	mg/L	M	--	--	ND	--	--
	(Total)											0E+0
Dermal Absorption	**Metals and Organometallic Analytes**											
	Iron	2.6	mg/L	0.001	2.6	mg/L	M	--	--	ND	--	--
	Manganese	0.41	mg/L	0.001	0.41	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.018	mg/L	0.001	0.018	mg/L	M	--	--	ND	--	--
	Methylmercury	2.8E-6	mg/L	0.001	2.8E-6	mg/L	M	--	--	ND	--	--
	(Total)											0E+0
											Total Risk Across all Exposure Pathways:	0E+0

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Undeveloped Area Surface Water
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent/Pre-Adolescent

Table 8.16.RME
Calculation of Cancer Risks
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Iron	2.6	mg/L	--	2.6	mg/L	M	--	--	ND	--	--
	Manganese	0.41	mg/L	--	0.41	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.018	mg/L	--	0.018	mg/L	M	--	--	ND	--	--
	Methylmercury	2.8E-6	mg/L	--	2.8E-6	mg/L	M	--	--	ND	--	--
	(Total)											0E+0
Dermal Absorption	**Metals and Organometallic Analytes**											
	Iron	2.6	mg/L	0.001	2.6	mg/L	M	--	--	ND	--	--
	Manganese	0.41	mg/L	0.001	0.41	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.018	mg/L	0.001	0.018	mg/L	M	--	--	ND	--	--
	Methylmercury	2.8E-6	mg/L	0.001	2.8E-6	mg/L	M	--	--	ND	--	--
	(Total)											0E+0
											Total Risk Across all Exposure Pathways:	0E+0

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.17.RME
Calculation of Cancer Risks
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Arsenic	0.0078	mg/L	--	0.0078	mg/L	M	2.7E-5	mg/kg-day	1.5E+0	(mg/kg-day)-1	4E-5
	Barium	0.41	mg/L	--	0.41	mg/L	M	--	--	ND	--	--
	Cadmium	0.0013	mg/L	--	0.0013	mg/L	M	--	--	ND	--	--
	Copper	0.016	mg/L	--	0.016	mg/L	M	--	--	ND	--	--
	Iron	15.4	mg/L	--	15.4	mg/L	M	--	--	ND	--	--
	Manganese	1.9	mg/L	--	1.9	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.0083	mg/L	--	0.0083	mg/L	M	--	--	ND	--	--
	Methylmercury	0.000023	mg/L	--	0.000023	mg/L	M	--	--	ND	--	--
	Nickel	0.022	mg/L	--	0.022	mg/L	M	--	--	ND	--	--
	Thallium	0.0029	mg/L	--	0.0029	mg/L	M	--	--	ND	--	--
	Vanadium	0.025	mg/L	--	0.025	mg/L	M	--	--	ND	--	--
	Organic Analytes											
	Acetone	0.053	mg/L	--	0.053	mg/L	M	--	--	ND	--	--
	Benzene	0.010	mg/L	--	0.010	mg/L	M	3.6E-5	mg/kg-day	5.5E-2	(mg/kg-day)-1	2E-6
	Chlorobenzene	0.0081	mg/L	--	0.0081	mg/L	M	--	--	ND	--	--
	Chloroethane	0.0063	mg/L	--	0.0063	mg/L	M	2.2E-5	mg/kg-day	2.9E-3	(mg/kg-day)-1	6E-8
	1,2-Dichloroethene, isomers	0.0083	mg/L	--	0.0083	mg/L	M	--	--	ND	--	--
	1,4-Dichlorobenzene	0.0040	mg/L	--	0.0040	mg/L	M	1.4E-5	mg/kg-day	2.4E-2	(mg/kg-day)-1	3E-7
	4-Methyl-2-pentanone	0.0072	mg/L	--	0.0072	mg/L	M	--	--	ND	--	--
	4-Methylphenol	0.0094	mg/L	--	0.0094	mg/L	M	--	--	ND	--	--
	Toluene	0.27	mg/L	--	0.27	mg/L	M	--	--	ND	--	--
	Xylene	0.037	mg/L	--	0.037	mg/L	M	--	--	ND	--	--
	PAHs											
	2-Methylnaphthalene	0.0010	mg/L	--	0.0010	mg/L	M	--	--	ND	--	--
	Naphthalene	0.013	mg/L	--	0.013	mg/L	M	--	--	ND	--	--
	(Total)											4E-5

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.17.RME (continued)
Calculation of Cancer Risks
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Dermal	**Metals and Organometallic Analytes**											
Absorption	Arsenic	0.0078	mg/L	0.001	0.0078	mg/L	M	8.9E-10	mg/kg-day	1.5E+0	(mg/kg-day)-1	1E-9
	Barium	0.41	mg/L	0.001	0.41	mg/L	M	--	--	ND	--	--
	Cadmium	0.0013	mg/L	0.001	0.0013	mg/L	M	--	--	ND	--	--
	Copper	0.0158	mg/L	0.001	0.0158	mg/L	M	--	--	ND	--	--
	Iron	15.4	mg/L	0.001	15.4	mg/L	M	--	--	ND	--	--
	Manganese	1.9	mg/L	0.001	1.9	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.0083	mg/L	0.001	0.0083	mg/L	M	--	--	ND	--	--
	Methylmercury	0.000023	mg/L	0.001	0.000023	mg/L	M	--	--	ND	--	--
	Nickel	0.022	mg/L	0.0001	0.022	mg/L	M	--	--	ND	--	--
	Thallium	0.0029	mg/L	0.001	0.0029	mg/L	M	--	--	ND	--	--
	Vanadium	0.025	mg/L	0.001	0.025	mg/L	M	--	--	ND	--	--
	Organic Analytes											
	Acetone	0.053	mg/L	0.0014	0.053	mg/L	M	--	--	ND	--	--
	Benzene	0.010	mg/L	0.021	0.010	mg/L	M	2.4E-8	mg/kg-day	5.5E-2	(mg/kg-day)-1	1E-9
	Chlorobenzene	0.0081	mg/L	0.041	0.0081	mg/L	M	--	--	ND	--	--
	Chloroethane	0.0063	mg/L	0.008	0.0063	mg/L	M	5.7E-9	mg/kg-day	2.9E-3	(mg/kg-day)-1	2E-11
	1,2-Dichloroethene, isomers	0.0083	mg/L	0.0013	0.0083	mg/L	M	--	--	ND	--	--
	1,4-Dichlorobenzene	0.004	mg/L	0.062	0.004	mg/L	M	2.8E-8	mg/kg-day	2.4E-2	(mg/kg-day)-1	7E-10
	4-Methyl-2-pentanone	0.0072	mg/L	0.000036	0.0072	mg/L	M	--	--	ND	--	--
	4-Methylphenol	0.0094	mg/L	0.0043	0.0094	mg/L	M	--	--	ND	--	--
	Toluene	0.27	mg/L	0.045	0.27	mg/L	M	--	--	ND	--	--
	Xylene	0.037	mg/L	0.081	0.037	mg/L	M	--	--	ND	--	--
	PAHs											
	2-Methylnaphthalene	0.0010	mg/L	0.069	0.0010	mg/L	M	--	--	ND	--	--
	Naphthalene	0.013	mg/L	0.069	0.013	mg/L	M	--	--	ND	--	--
	(Total)											3E-9
											Total Risk Across all Exposure Pathways:	4E-5

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Resident
Receptor Age: Adult

Table 8.18.RME
Calculation of Cancer Risks
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Arsenic	0.0078	mg/L	--	0.0078	mg/L	M	9.2E-5	mg/kg-day	1.5E+0	(mg/kg-day)-1	1E-4
	Barium	0.41	mg/L	--	0.41	mg/L	M	--	--	ND	--	--
	Cadmium	0.0013	mg/L	--	0.0013	mg/L	M	--	--	ND	--	--
	Copper	0.016	mg/L	--	0.016	mg/L	M	--	--	ND	--	--
	Iron	15.4	mg/L	--	15.4	mg/L	M	--	--	ND	--	--
	Manganese	1.9	mg/L	--	1.9	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.0083	mg/L	--	0.0083	mg/L	M	--	--	ND	--	--
	Methylmercury	0.000023	mg/L	--	0.000023	mg/L	M	--	--	ND	--	--
	Nickel	0.022	mg/L	--	0.022	mg/L	M	--	--	ND	--	--
	Thallium	0.0029	mg/L	--	0.0029	mg/L	M	--	--	ND	--	--
	Vanadium	0.025	mg/L	--	0.025	mg/L	M	--	--	ND	--	--
	Organic Analytes											
	Acetone	0.053	mg/L	--	0.053	mg/L	M	--	--	ND	--	--
	Benzene	0.010	mg/L	--	0.010	mg/L	M	1.2E-4	mg/kg-day	5.5E-2	(mg/kg-day)-1	7E-6
	Chlorobenzene	0.0081	mg/L	--	0.0081	mg/L	M	--	--	ND	--	--
	Chloroethane	0.0063	mg/L	--	0.0063	mg/L	M	7.4E-5	mg/kg-day	2.9E-3	(mg/kg-day)-1	2E-7
	1,2-Dichloroethene, isomers	0.0083	mg/L	--	0.0083	mg/L	M	--	--	ND	--	--
	1,4-Dichlorobenzene	0.0040	mg/L	--	0.0040	mg/L	M	4.7E-5	mg/kg-day	2.4E-2	(mg/kg-day)-1	1E-6
	4-Methyl-2-pentanone	0.0072	mg/L	--	0.0072	mg/L	M	--	--	ND	--	--
	4-Methylphenol	0.0094	mg/L	--	0.0094	mg/L	M	--	--	ND	--	--
	Toluene	0.27	mg/L	--	0.27	mg/L	M	--	--	ND	--	--
	Xylene	0.037	mg/L	--	0.037	mg/L	M	--	--	ND	--	--
	PAHs											
	2-Methylnaphthalene	0.0010	mg/L	--	0.0010	mg/L	M	--	--	ND	--	--
	4-Methylphenol	0.013	mg/L	--	0.013	mg/L	M	--	--	ND	--	--
	(Total)											1E-4

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Resident
Receptor Age: Adult

Table 8.18 .RME (Continued)
Calculation of Cancer Risks
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Dermal	**Metals and Organometallic Analytes**											
Absorption	Arsenic	0.0078	mg/L	0.001	0.0078	mg/L	M	2.1E-7	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-7
	Barium	0.41	mg/L	0.001	0.41	mg/L	M	--	--	ND	--	--
	Cadmium	0.0013	mg/L	0.001	0.0013	mg/L	M	--	--	ND	--	--
	Copper	0.016	mg/L	0.001	0.016	mg/L	M	--	--	ND	--	--
	Iron	15.4	mg/L	0.001	15.4	mg/L	M	--	--	ND	--	--
	Manganese	1.9	mg/L	0.001	1.9	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.0083	mg/L	0.001	0.0083	mg/L	M	--	--	ND	--	--
	Methylmercury	0.000023	mg/L	0.001	0.000023	mg/L	M	--	--	ND	--	--
	Nickel	0.022	mg/L	0.0001	0.022	mg/L	M	--	--	ND	--	--
	Thallium	0.0029	mg/L	0.001	0.0029	mg/L	M	--	--	ND	--	--
	Vanadium	0.025	mg/L	0.001	0.025	mg/L	M	--	--	ND	--	--
	Organic Analytes											
	Acetone	0.053	mg/L	0.0014	0.053	mg/L	M	--	--	ND	--	--
	Benzene	0.010	mg/L	0.021	0.010	mg/L	M	5.7E-6	mg/kg-day	5.5E-2	(mg/kg-day)-1	3E-7
	Chlorobenzene	0.0081	mg/L	0.041	0.0081	mg/L	M	--	--	ND	--	--
	Chloroethane	0.0063	mg/L	0.008	0.0063	mg/L	M	1.3E-6	mg/kg-day	2.9E-3	(mg/kg-day)-1	4E-9
	1,2-Dichloroethene, isomers	0.0083	mg/L	0.0013	0.0083	mg/L	M	--	--	ND	--	--
	1,4-Dichlorobenzene	0.0040	mg/L	0.062	0.0040	mg/L	M	6.6E-6	mg/kg-day	2.4E-2	(mg/kg-day)-1	2E-7
	4-Methyl-2-pentanone	0.0072	mg/L	0.000036	0.0072	mg/L	M	--	--	ND	--	--
	4-Methylphenol	0.0094	mg/L	0.0043	0.0094	mg/L	M	--	--	ND	--	--
	Toluene	0.27	mg/L	0.045	0.27	mg/L	M	--	--	ND	--	--
	Xylene	0.037	mg/L	0.081	0.037	mg/L	M	--	--	ND	--	--
	PAHs											
	2-Methylnaphthalene	0.0010	mg/L	0.069	0.0010	mg/L	M	--	--	ND	--	--
	Naphthalene	0.013	mg/L	0.069	0.013	mg/L	M	--	--	ND	--	--
	(Total)											8E-7
											Total Risk Across all Exposure Pathways:	1E-4

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
ND - not determined by EPA or not considered to be a carcinogen
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (1999a).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Indoor Air -Showering/Bathing
Receptor Population: Resident
Receptor Age: Adult

Table 8.19:RME
Calculation of Cancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[b]	Cancer Slope Factor Units	Cancer Risk
Inhalation	**Organic Analytes**											
	Acetone	2.9	mg/m^3	--	2.9	mg/m^3	M	--	--	ND	--	--
	Benzene	0.56	mg/m^3	--	0.56	mg/m^3	M	5.8E-03	mg/m^3-day	7.8E-3	m^3-day/mg	5E-5
	Bis[2-ethylhexyl]phthalate	0.18	mg/m^3	--	0.18	mg/m^3	M	1.8E-03	mg/m^3-day	4.0E-3	m^3-day/mg	7E-6
	Chlorobenzene	0.19	mg/m^3	--	0.19	mg/m^3	M	--	--	ND	--	--
	Chloroethane	0.23	mg/m^3	--	0.23	mg/m^3	M	2.4E-03	mg/m^3-day	8.3E-4	m^3-day/mg	2E-6
	1,4-Dichlorobenzene	0.12	mg/m^3	--	0.12	mg/m^3	M	1.2E-03	mg/m^3-day	6.3E-3	m^3-day/mg	8E-6
	1,2-Dichloroethene, isomers	0.02	mg/m^3	--	0.02	mg/m^3	M	--	--	ND	--	--
	4-Methyl-2-pentanone	0.28	mg/m^3	--	0.28	mg/m^3	M	--	--	ND	--	--
	4-Methylphenol	0.38	mg/m^3	--	0.38	mg/m^3	M	--	--	ND	--	--
	Toluene	1.1	mg/m^3	--	1.1	mg/m^3	M	--	--	ND	--	--
	Xylenes	1.7	mg/m^3	--	1.7	mg/m^3	M	--	--	ND	--	--
	PAHs											
	Naphthalene	0.50	mg/m^3	--	0.50	mg/m^3	M	--	--	ND	--	--
	2-Methylnapthalene	0.029	mg/m^3	--	0.029	mg/m^3	M	--	--	ND	--	--
											Total Risk:	6E-5
											Total Risk Across all Exposure Pathways:	6E-5

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Andelman Model as modified by Shaum et al (1994) and site groundwater data.
[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Resident
Receptor Age: Child

Table 8.20.RME
Calculation of Cancer Risks
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Arsenic	0.0078	mg/L	--	0.0078	mg/L	M	6.4E-5	mg/kg-day	1.5E+0	(mg/kg-day)-1	1E-4
	Barium	0.41	mg/L	--	0.41	mg/L	M	--	--	ND	--	--
	Cadmium	0.0013	mg/L	--	0.0013	mg/L	M	--	--	ND	--	--
	Copper	0.016	mg/L	--	0.016	mg/L	M	--	--	ND	--	--
	Iron	15.4	mg/L	--	15.4	mg/L	M	--	--	ND	--	--
	Manganese	1.9	mg/L	--	1.9	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.0083	mg/L	--	0.0083	mg/L	M	--	--	ND	--	--
	Methylmercury	0.000023	mg/L	--	0.000023	mg/L	M	--	--	ND	--	--
	Nickel	0.022	mg/L	--	0.022	mg/L	M	--	--	ND	--	--
	Thallium	0.0029	mg/L	--	0.0029	mg/L	M	--	--	ND	--	--
	Vanadium	0.025	mg/L	--	0.025	mg/L	M	--	--	ND	--	--
	Organic Analytes											
	Acetone	0.053	mg/L	--	0.053	mg/L	M	--	--	ND	--	--
	Benzene	0.010	mg/L	--	0.010	mg/L	M	8.4E-5	mg/kg-day	5.5E-2	(mg/kg-day)-1	5E-6
	Chlorobenzene	0.0081	mg/L	--	0.0081	mg/L	M	--	--	ND	--	--
	Chloroethane	0.0063	mg/L	--	0.0063	mg/L	M	5.2E-5	mg/kg-day	2.9E-3	(mg/kg-day)-1	2E-7
	1,2-Dichloroethene, isomers	0.0083	mg/L	--	0.0083	mg/L	M	--	--	ND	--	--
	1,4-Dichlorobenzene	0.0040	mg/L	--	0.0040	mg/L	M	3.3E-5	mg/kg-day	2.4E-2	(mg/kg-day)-1	8E-7
	4-Methyl-2-pentanone	0.0072	mg/L	--	0.0072	mg/L	M	--	--	ND	--	--
	4-Methylphenol	0.0094	mg/L	--	0.0094	mg/L	M	--	--	ND	--	--
	Toluene	0.27	mg/L	--	0.27	mg/L	M	--	--	ND	--	--
	Xylene	0.037	mg/L	--	0.037	mg/L	M	--	--	ND	--	--
	PAHs											
	2-Methylnaphthalene	0.0010	mg/L	--	0.0010	mg/L	M	--	--	ND	--	--
	Naphthalene	0.013	mg/L	--	0.013	mg/L	M	--	--	ND	--	--
	(Total)											1E-4

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Resident
Receptor Age: Child

Table 8.20.RME (continued)
Calculation of Cancer Risks
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Dermal Absorption	**Metals and Organometallic Analytes**											
	Arsenic	0.0078	mg/L	0.001	0.0078	mg/L	M	1.3E-7	mg/kg-day	1.5E+0	(mg/kg-day)-1	2E-7
	Barium	0.41	mg/L	0.001	0.41	mg/L	M	--	--	ND	--	--
	Cadmium	0.0013	mg/L	0.001	0.0013	mg/L	M	--	--	ND	--	--
	Copper	0.016	mg/L	0.001	0.016	mg/L	M	--	--	ND	--	--
	Iron	15.4	mg/L	0.001	15.4	mg/L	M	--	--	ND	--	--
	Manganese	1.9	mg/L	0.001	1.9	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.0083	mg/L	0.001	0.0083	mg/L	M	--	--	ND	--	--
	Methylmercury	0.000023	mg/L	0.001	0.000023	mg/L	M	--	--	ND	--	--
	Nickel	0.022	mg/L	0.0001	0.022	mg/L	M	--	--	ND	--	--
	Thallium	0.0029	mg/L	0.001	0.0029	mg/L	M	--	--	ND	--	--
	Vanadium	0.025	mg/L	0.001	0.025	mg/L	M	--	--	ND	--	--
	Organic Analytes											
	Acetone	0.05	mg/L	0.0014	0.05	mg/L	M	--	--	ND	--	--
	Benzene	0.010	mg/L	0.021	0.010	mg/L	M	3.5E-6	mg/kg-day	5.5E-2	(mg/kg-day)-1	2E-7
	Chlorobenzene	0.0081	mg/L	0.041	0.0081	mg/L	M	--	--	ND	--	--
	Chloroethane	0.0063	mg/L	0.008	0.0063	mg/L	M	8.2E-7	mg/kg-day	2.9E-3	(mg/kg-day)-1	2E-9
	1,2-Dichloroethene, isomers	0.0083	mg/L	0.0013	0.0083	mg/L	M	--	--	ND	--	--
	1,4-Dichlorobenzene	0.0040	mg/L	0.062	0.0040	mg/L	M	4.0E-6	mg/kg-day	2.4E-2	(mg/kg-day)-1	1E-7
	4-Methyl-2-pentanone	0.0072	mg/L	0.000036	0.0072	mg/L	M	--	--	ND	--	--
	4-Methylphenol	0.0094	mg/L	0.0043	0.0094	mg/L	M	--	--	ND	--	--
	Toluene	0.27	mg/L	0.045	0.27	mg/L	M	--	--	ND	--	--
	Xylene	0.037	mg/L	0.081	0.037	mg/L	M	--	--	ND	--	--
	PAHs											
	2-Methylnaphthalene	0.0010	mg/L	0.069	0.0010	mg/L	M	--	--	ND	--	--
	Naphthalene	0.013	mg/L	0.069	0.013	mg/L	M	--	--	ND	--	--
	(Total)											5E-7
											Total Risk Across all Exposure Pathways:	1E-4

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit
ND - not determined by EPA or not considered to be a carcinogen

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (1999a).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Indoor Air -Showering/Bathing
Receptor Population: Resident
Receptor Age: Child

Table 8.21.RME
Calculation of Cancer Hazards
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[b]	Cancer Slope Factor Units	Cancer Risk
Inhalation	**Organic Analytes**											
	Acetone	5.2	mg/m^3	--	5.2	mg/m^3	M	--	--	ND	--	--
	Benzene	0.99	mg/m^3	--	0.99	mg/m^3	M	3.5E-03	mg/m^3-day	7.8E-3	m^3-day/mg	3E-5
	Bis[2-ethylhexyl]phthalate	0.31	mg/m^3	--	0.31	mg/m^3	M	1.1E-03	mg/m^3-day	4.0E-3	m^3-day/mg	4E-6
	Chlorobenzene	0.33	mg/m^3	--	0.33	mg/m^3	M	--	--	ND	--	--
	Chloroethane	0.41	mg/m^3	--	0.41	mg/m^3	M	1.5E-03	mg/m^3-day	8.3E-4	m^3-day/mg	1E-6
	1,4-Dichlorobenzene	0.21	mg/m^3	--	0.21	mg/m^3	M	7.5E-04	mg/m^3-day	6.3E-3	m^3-day/mg	5E-6
	1,2-Dichloroethene, isomers	0.02	mg/m^3	--	0.02	mg/m^3	M	--	--	ND	--	--
	4-Methyl-2-pentanone	0.49	mg/m^3	--	0.49	mg/m^3	M	--	--	ND	--	--
	4-Methylphenol	0.68	mg/m^3	--	0.68	mg/m^3	M	--	--	ND	--	--
	Toluene	2.0	mg/m^3	--	2.0	mg/m^3	M	--	--	ND	--	--
	Xylenes	3.0	mg/m^3	--	3.0	mg/m^3	M	--	--	ND	--	--
	PAHs											
	Naphthalene	0.89	mg/m^3	--	0.89	mg/m^3	M	--	--	ND	--	--
	2-Methylnapthalene	0.052	mg/m^3	--	0.052	mg/m^3	M	--	--	ND	--	--
											Total Risk:	4E-5
											Total Risk Across all Exposure Pathways:	4E-5

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Andelman Model as modified by Shaum et al (1994) and site groundwater data.
[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Current/Future
Medium: Air
Exposure Medium: Air
Exposure Point: Outdoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.1.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[b]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	**Metals and Organometallic Analytes**													
	Mercury vapor	3.3E-5	mg/m^3	--	3.3E-5	mg/m^3	M	8.4E-7	mg/kg-day	8.6E-5	mg/kg-day	--	--	0.010
	(Total)													0.010
													Total Hazard Index Across All Exposure Routes/Pathways:	0.010

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b]Represents inhalation reference dose for mercury vapor obtained from the inhalation RfC from EPA Integrated Risk Information System (IRIS) (January 2003b).

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Developed Area Indoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.2.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[b]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	**Organic Analytes**													
	Benzene	1.3E-2	mg/m^3	--	1.3E-2	mg/m^3	M	1.1E-3	mg/kg-day	8.6E-3	mg/kg-day	--	--	0.13
	PAHs													
	2-Methylnaphthalene	1.2E-3	mg/m^3	--	1.2E-3	mg/m^3	M	1.0E-4	mg/kg-day	8.6E-4	mg/kg-day	--	--	0.12
	(Total)													0.25
													Total Hazard Index Across All Exposure Routes/Pathways:	0.25

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Johnson and Ettinger Model and site subsurface soil data.

[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Developed Area Indoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.3.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[b]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	**Organic Analytes**													
	Acetone	3.6E-5	mg/m^3	--	3.6E-5	mg/m^3	M	3.2E-6	mg/kg-day	1.0E-1	mg/kg-day	--	--	0.000032
	Benzene	9.7E-5	mg/m^3	--	9.7E-5	mg/m^3	M	8.5E-6	mg/kg-day	8.6E-3	mg/kg-day	--	--	0.0010
	Chlorobenzene	4.2E-5	mg/m^3	--	4.2E-5	mg/m^3	M	3.7E-6	mg/kg-day	1.7E-2	mg/kg-day	--	--	0.00022
	Chloroethane	3.1E-4	mg/m^3	--	3.1E-4	mg/m^3	M	2.7E-5	mg/kg-day	2.9E+0	mg/kg-day	--	--	0.0000093
	1,4-Dichlorobenzene	1.3E-5	mg/m^3	--	1.3E-5	mg/m^3	M	1.2E-6	mg/kg-day	2.3E-1	mg/kg-day	--	--	0.0000050
	1,2-Dichloroethene, isomers	8.7E-5	mg/m^3	--	8.7E-5	mg/m^3	M	7.6E-6	mg/kg-day	2.0E-2	mg/kg-day	--	--	0.00038
	4-Methyl-2-pentanone	6.3E-6	mg/m^3	--	6.3E-6	mg/m^3	M	5.6E-7	mg/kg-day	2.3E-2	mg/kg-day	--	--	0.000024
	Toluene	2.7E-3	mg/m^3	--	2.7E-3	mg/m^3	M	2.4E-4	mg/kg-day	1.1E-1	mg/kg-day	--	--	0.0022
	Xylenes	3.2E-4	mg/m^3	--	3.2E-4	mg/m^3	M	2.8E-5	mg/kg-day	2.9E-2	mg/kg-day	--	--	0.0010
	PAHs													
	Naphthalene	1.6E-5	mg/m^3	--	1.6E-5	mg/m^3	M	1.4E-6	mg/kg-day	8.6E-4	mg/kg-day	--	--	0.0016
	2-Methylnapthalene	1.1E-6	mg/m^3	--	1.1E-6	mg/m^3	M	9.5E-8	mg/kg-day	8.6E-4	mg/kg-day	--	--	0.00011
	(Total)													0.0066
													Total Hazard Index Across All Exposure Routes/Pathways:	0.0066

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Johnson and Ettinger Model and site subsurface soil data.
[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Undeveloped Area Indoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.4.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[b]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	**Organic Analytes**													
	Carbazole	6.1E-8	mg/m^3	--	6.1E-8	mg/m^3	M	--	--	ND	--	--	--	--
	Toluene	2.6E-2	mg/m^3	--	2.6E-2	mg/m^3	M	2.3E-3	mg/kg-day	1.1E-1	mg/kg-day	--	--	0.020
	Xylenes	4.0E-2	mg/m^3		4.0E-2	mg/m^3	M	3.6E-3	mg/kg-day	2.9E-2	mg/kg-day	--	--	0.12
	PAHs													
	Benz[a]anthracene	1.4E-6	mg/m^3	--	1.4E-6	mg/m^3	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	1.2E-6	mg/m^3	--	1.2E-6	mg/m^3	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	1.6E-6	mg/m^3	--	1.6E-6	mg/m^3	M	--	--	ND	--	--	--	--
	Benzo[ghi]perylene	5.2E-7	mg/m^3	--	5.2E-7	mg/m^3	M	4.6E-8	mg/kg-day	8.6E-4	mg/kg-day	--	--	0.000053
	Benzo[k]fluoranthene	4.6E-7	mg/m^3	--	4.6E-7	mg/m^3	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	1.6E-7	mg/m^3	--	1.6E-7	mg/m^3	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	5.4E-7	mg/m^3	--	5.4E-7	mg/m^3	M	--	--	ND	--	--	--	--
	2-Methylnaphthalene	1.2E-3	mg/m^3	--	1.2E-3	mg/m^3	M	1.0E-4	mg/kg-day	8.6E-4	mg/kg-day	--	--	0.12
	Naphthalene	3.0E-3	mg/m^3	--	3.0E-3	mg/m^3	M	2.7E-4	mg/kg-day	8.6E-4	mg/kg-day	--	--	0.31
	(Total)													0.57
													Total Hazard Index Across All Exposure Routes/Pathways:	0.57

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Johnson and Ettinger Model and site subsurface soil data.

[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Undeveloped Area Indoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.5.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[b]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	**Organic Analytes**													
	Acetone	3.6E-5	mg/m^3	--	3.6E-5	mg/m^3	M	3.2E-6	mg/kg-day	1.0E-1	mg/kg-day	--	--	0.000032
	Benzene	9.7E-5	mg/m^3	--	9.7E-5	mg/m^3	M	8.5E-6	mg/kg-day	8.6E-3	mg/kg-day	--	--	0.0010
	Chlorobenzene	4.2E-5	mg/m^3	--	4.2E-5	mg/m^3	M	3.7E-6	mg/kg-day	1.7E-2	mg/kg-day	--	--	0.00022
	Chloroethane	3.1E-4	mg/m^3	--	3.1E-4	mg/m^3	M	2.7E-5	mg/kg-day	2.9E+0	mg/kg-day	--	--	0.0000093
	1,4-Dichlorobenzene	1.3E-5	mg/m^3	--	1.3E-5	mg/m^3	M	1.2E-6	mg/kg-day	2.3E-1	mg/kg-day	--	--	0.0000050
	1,2-Dichloroethene, isomers	8.7E-5	mg/m^3	--	8.7E-5	mg/m^3	M	7.6E-6	mg/kg-day	2.0E-2	mg/kg-day	--	--	0.00038
	4-Methyl-2-pentanone	6.3E-6	mg/m^3	--	6.3E-6	mg/m^3	M	5.6E-7	mg/kg-day	2.3E-2	mg/kg-day	--	--	0.000024
	Toluene	2.7E-3	mg/m^3	--	2.7E-3	mg/m^3	M	2.4E-4	mg/kg-day	1.1E-1	mg/kg-day	--	--	0.0022
	Xylenes	3.2E-4	mg/m^3	--	3.2E-4	mg/m^3	M	2.8E-5	mg/kg-day	2.9E-2	mg/kg-day	--	--	0.0010
	PAHs													
	Naphthalene	1.6E-5	mg/m^3	--	1.6E-5	mg/m^3	M	1.4E-6	mg/kg-day	8.6E-4	mg/kg-day	--	--	0.0016
	2-Methylnapthalene	1.1E-6	mg/m^3	--	1.1E-6	mg/m^3	M	9.5E-8	mg/kg-day	8.6E-4	mg/kg-day	--	--	0.00011
	(Total)													0.0066
													Total Hazard Index Across All Exposure Routes/Pathways:	0.0066

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference concentration established by EPA.
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Johnson and Ettinger Model and site subsurface soil data.

[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Developed Area Surface Soil (unpaved)
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.6.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Aluminum	12000	mg/kg	--	12000	mg/kg	M	5.9E-3	mg/kg-day	1.0E+0	mg/kg-day	--	--	0.0059
	Arsenic	11	mg/kg	--	11	mg/kg	M	5.4E-6	mg/kg-day	3.0E-4	mg/kg-day	--	--	0.018
	Chromium	97	mg/kg	--	97	mg/kg	M	4.7E-5	mg/kg-day	3.0E-3	mg/kg-day	--	--	0.016
	Copper	470	mg/kg	--	470	mg/kg	M	2.3E-4	mg/kg-day	4.0E-2	mg/kg-day	--	--	0.0057
	Iron	23000	mg/kg	--	23000	mg/kg	M	1.1E-2	mg/kg-day	3.0E-1	mg/kg-day	--	--	0.038
	Manganese	540	mg/kg	--	540	mg/kg	M	2.6E-4	mg/kg-day	4.7E-2	mg/kg-day	--	--	0.0057
	Mercury (total)	310	mg/kg	--	310	mg/kg	M	1.5E-4	mg/kg-day	3.0E-4	mg/kg-day	--	--	0.51
	Vanadium	140	mg/kg	--	140	mg/kg	M	6.8E-5	mg/kg-day	9.0E-3	mg/kg-day	--	--	0.0076
	Organic Analytes													
	PAHs													
	Benzo[a]pyrene	0.41	mg/kg	--	0.41	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	0.75	mg/kg	--	0.75	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.071	mg/kg	--	0.071	mg/kg	M	--	--	ND	--	--	--	--
	(Total)													0.60
Dermal Absorption	**Metals and Organometallic Analytes**													
	Arsenic	11	mg/kg	0.03	11	mg/kg	M	2.1E-7	mg/kg-day	3.0E-4	mg/kg-day	--	--	0.00071
	Organic Analytes													
	PAHs													
	Benzo[a]pyrene	0.41	mg/kg	0.13	0.41	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	0.75	mg/kg	0.13	0.75	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.071	mg/kg	0.13	0.071	mg/kg	M	--	--	ND	--	--	--	--
	(Total)													0.00071
													Total Hazard Index Across All Exposure Routes/Pathways:	0.60

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Developed Area Surface Soil (all)
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.7.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Aluminum	12000	mg/kg	--	12000	mg/kg	M	5.9E-3	mg/kg-day	1.0E+0	mg/kg-day	--	--	0.0059
	Arsenic	11	mg/kg	--	11	mg/kg	M	5.4E-6	mg/kg-day	3.0E-4	mg/kg-day	--	--	0.018
	Chromium	76	mg/kg	--	76	mg/kg	M	3.7E-5	mg/kg-day	3.0E-3	mg/kg-day	--	--	0.012
	Copper	689	mg/kg	--	689	mg/kg	M	3.4E-4	mg/kg-day	4.0E-2	mg/kg-day	--	--	0.0084
	Iron	21574	mg/kg	--	21574	mg/kg	M	1.1E-2	mg/kg-day	3.0E-1	mg/kg-day	--	--	0.035
	Manganese	399	mg/kg	--	399	mg/kg	M	2.0E-4	mg/kg-day	4.7E-2	mg/kg-day	--	--	0.0042
	Mercury (total)	2250	mg/kg	--	2250	mg/kg	M	1.1E-3	mg/kg-day	3.0E-4	mg/kg-day	--	--	3.7
	Thallium	2.4	mg/kg	--	2.4	mg/kg	M	1.2E-6	mg/kg-day	8.0E-5	mg/kg-day	--	--	0.015
	Vanadium	140	mg/kg	--	140	mg/kg	M	6.8E-5	mg/kg-day	9.0E-3	mg/kg-day	--	--	0.0076
	Organic Analytes													
	Benzene	0.29	mg/kg	--	0.3	mg/kg	M	1.4E-7	mg/kg-day	4.0E-3	mg/kg-day	--	--	0.000035
	PAHs													
	Benz[a]anthracene	0.85	mg/kg	--	0.85	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	0.68	mg/kg	--	0.68	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	1.1	mg/kg	--	1.1	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.15	mg/kg	--	0.15	mg/kg	M	--	--	ND	--	--	--	--
	(Total)													3.8
Dermal Absorption	**Metals and Organometallic Analytes**													
	Arsenic	11	mg/kg	0.03	11	mg/kg	M	2.1E-7	mg/kg-day	3.0E-4	mg/kg-day	--	--	0.00071
	Organic Analytes													
	PAHs													
	Benz[a]anthracene	0.85	mg/kg	0.13	0.85	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	0.68	mg/kg	0.13	0.68	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	1.1	mg/kg	0.13	1.1	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.15	mg/kg	0.13	0.15	mg/kg	M	--	--	ND	--	--	--	--
	(Total)													0.00071
													Total Hazard Index Across All Exposure Routes/Pathways:	3.8

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Developed Area Subsurface Soil (1-20 ft)
Receptor Population: Construction Worker
Receptor Age: Adult

Table 7.8.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Arsenic	9.9	mg/kg	--	9.9	mg/kg	M	1.9E-8	mg/kg-day	0.0003	mg/kg-day	--	--	0.000065
	Barium	818	mg/kg	--	818	mg/kg	M	1.6E-6	mg/kg-day	0.07	mg/kg-day	--	--	0.000023
	Chromium	131	mg/kg	--	131	mg/kg	M	2.6E-7	mg/kg-day	0.003	mg/kg-day	--	--	0.000085
	Copper	7420	mg/kg	--	7420	mg/kg	M	1.5E-5	mg/kg-day	0.040	mg/kg-day	--	--	0.00036
	Iron	35400	mg/kg	--	35400	mg/kg	M	6.9E-5	mg/kg-day	0.30	mg/kg-day	--	--	0.00023
	Manganese	812	mg/kg	--	812	mg/kg	M	1.6E-6	mg/kg-day	0.047	mg/kg-day	--	--	0.000034
	Mercury (total)	1269	mg/kg	--	1269	mg/kg	M	2.5E-6	mg/kg-day	0.0003	mg/kg-day	--	--	0.0083
	Thallium	5.4	mg/kg	--	5.4	mg/kg	M	1.1E-8	mg/kg-day	0.00008	mg/kg-day	--	--	0.00013
	Organic Analytes													
	Benzene	2.8	mg/kg	--	2.8	mg/kg	M	5.5E-9	mg/kg-day	0.004	mg/kg-day	--	--	0.0000014
	PAHs													
	2-Methylnaphthalene	0.45	mg/kg	--	0	mg/kg	M	8.8E-10	mg/kg-day	0.02	mg/kg-day	--	--	0.000000044
	PCBs (as Aroclor 1254)	0.36	mg/kg	--	0.36	mg/kg	M	7.0E-10	mg/kg-day	0.00002	mg/kg-day	--	--	0.000035
	(Total)													0.0092
Dermal Absorption	**Metals and Organometallic Analytes**													
	Arsenic	9.9	mg/kg	0.03	9.9	mg/kg	M	9.6E-08	mg/kg-day	0.0003	mg/kg-day	--	--	0.00032
	Organic Analytes													
	PAHs													
	2-Methylnaphthalene	0.45	mg/kg	0.13	0	mg/kg	M	1.9E-08	mg/kg-day	0.02	mg/kg-day	--	--	0.00000094
	PCBs (as Aroclor 1254)	0.36	mg/kg	0.14	0.36	mg/kg	M	1.6E-08	mg/kg-day	0.00002	mg/kg-day	--	--	0.00081
	(Total)													0.0011
													Total Hazard Index Across All Exposure Routes/Pathways:	0.010

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Undeveloped Area Surface Soil
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.9.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Aluminum	6157	mg/kg	--	6157	mg/kg	M	3.0E-3	mg/kg-day	1.0	mg/kg-day	--	--	0.0030
	Antimony	12.7	mg/kg	--	12.7	mg/kg	M	6.2E-6	mg/kg-day	0.0004	mg/kg-day	--	--	0.016
	Arsenic	9.6	mg/kg	--	9.6	mg/kg	M	4.7E-6	mg/kg-day	0.0003	mg/kg-day	--	--	0.016
	Barium	1530	mg/kg	--	1530	mg/kg	M	7.5E-4	mg/kg-day	0.070	mg/kg-day	--	--	0.011
	Cadmium	14.9	mg/kg	--	14.9	mg/kg	M	7.3E-6	mg/kg-day	0.01	mg/kg-day	--	--	0.00073
	Chromium	390	mg/kg	--	390	mg/kg	M	1.9E-4	mg/kg-day	0.003	mg/kg-day	--	--	0.064
	Copper	587	mg/kg	--	587	mg/kg	M	2.9E-4	mg/kg-day	0.040	mg/kg-day	--	--	0.0072
	Iron	34588	mg/kg	--	34588	mg/kg	M	1.7E-2	mg/kg-day	0.30	mg/kg-day	--	--	0.056
	Manganese	679	mg/kg	--	679	mg/kg	M	3.3E-4	mg/kg-day	0.047	mg/kg-day	--	--	0.0071
	Mercury (total)	507	mg/kg	--	507	mg/kg	M	2.5E-4	mg/kg-day	0.0003	mg/kg-day	--	--	0.83
	Methylmercury	0.32	mg/kg	--	0.32	mg/kg	M	1.6E-7	mg/kg-day	0.0001	mg/kg-day	--	--	0.0016
	Nickel	51.1	mg/kg	--	51.1	mg/kg	M	2.5E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0013
	Silver	22.1	mg/kg	--	22.1	mg/kg	M	1.1E-5	mg/kg-day	0.005	mg/kg-day	--	--	0.0022
	Thallium	4.2	mg/kg	--	4.2	mg/kg	M	2.1E-6	mg/kg-day	0.00008	mg/kg-day	--	--	0.026
	Vanadium	73.1	mg/kg	--	73.1	mg/kg	M	3.6E-5	mg/kg-day	0.009	mg/kg-day	--	--	0.0040
	Zinc	18443	mg/kg	--	18443	mg/kg	M	9.0E-3	mg/kg-day	0.30	mg/kg-day	--	--	0.030
	Organic Analytes													
	Bis[2-ethylhexyl]phthalate	49	mg/kg	--	49	mg/kg	M	2.4E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0012
	PAHs													
	Benz[a]anthracene	2.4	mg/kg	--	2.4	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	2.8	mg/kg	--	2.8	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	3.2	mg/kg	--	3.2	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.90	mg/kg	--	0.90	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	--	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Naphthalene	5.1	mg/kg	--	5.1	mg/kg	M	2.5E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00012
	2-Methylnaphthalene	2.5	mg/kg	--	2.5	mg/kg	M	1.2E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.000060
	PCBs as Aroclor 1254	4.4	mg/kg	--	5.0	mg/kg	M	2.2E-6	mg/kg-day	0.00002	mg/kg-day	--	--	0.11
	(Total)													1.2
Dermal Absorption	**Metals and Organometallic Analytes**													
	Arsenic	9.6	mg/kg	0.03	9.6	mg/kg	M	1.9E-07	mg/kg-day	0.0003	mg/kg-day	--	--	0.00062
	Cadmium	14.9	mg/kg	0.001	14.9	mg/kg	M	9.6E-9	mg/kg-day	0.0005	mg/kg-day	--	--	0.000019
	Organic Analytes													
	Bis[2-ethylhexyl]phthalate	49	mg/kg	0.10	49	mg/kg	M	3.1E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00016
	PAHs													
	Benz[a]anthracene	2.4	mg/kg	0.13	2.4	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	2.8	mg/kg	0.13	2.8	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	3.2	mg/kg	0.13	3.2	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.90	mg/kg	0.13	0.90	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	0.13	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Naphthalene	5.1	mg/kg	0.13	5.1	mg/kg	M	4.3E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.000021
	2-Methylnaphthalene	2.5	mg/kg	0.13	2.5	mg/kg	M	2.1E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.000010
	PCBs as Aroclor 1254	4.4	mg/kg	0.14	4.4	mg/kg	M	4.0E-7	mg/kg-day	0.00002	mg/kg-day	--	--	0.020
	(Total)													0.021
													Total Hazard Index Across All Exposure Routes/Pathways:	1.2

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Undeveloped Area Surface Sediment
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Table 7.10.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Aluminum	13900	mg/kg	--	13900	mg/kg	M	1.8E-3	mg/kg-day	1.0	mg/kg-day	--	--	0.0018
	Arsenic	8.8	mg/kg	--	8.8	mg/kg	M	1.1E-6	mg/kg-day	0.0003	mg/kg-day	--	--	0.0037
	Cadmium	9.1	mg/kg	--	9.1	mg/kg	M	1.2E-6	mg/kg-day	0.01	mg/kg-day	--	--	0.00012
	Chromium	156	mg/kg	--	156	mg/kg	M	2.0E-5	mg/kg-day	0.003	mg/kg-day	--	--	0.0066
	Iron	21400	mg/kg	--	21400	mg/kg	M	2.7E-3	mg/kg-day	0.30	mg/kg-day	--	--	0.0091
	Mercury (total)	1290	mg/kg	--	1290	mg/kg	M	1.6E-4	mg/kg-day	0.0003	mg/kg-day	--	--	0.55
	Methylmercury	0.13	mg/kg	--	0.13	mg/kg	M	1.6E-8	mg/kg-day	0.0001	mg/kg-day	--	--	0.00016
	Thallium	4.8	mg/kg	--	4.8	mg/kg	M	6.1E-7	mg/kg-day	0.00008	mg/kg-day	--	--	0.0076
	Vanadium	69	mg/kg	--	69	mg/kg	M	8.8E-6	mg/kg-day	0.009	mg/kg-day	--	--	0.0010
	Zinc	3540	mg/kg	--	3540	mg/kg	M	4.5E-4	mg/kg-day	0.30	mg/kg-day	--	--	0.0015
	Organic Analytes													
	PAHs													
	Benz[a]anthracene	1.7	mg/kg	--	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	1.6	mg/kg	--	1.6	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	1.8	mg/kg	--	1.8	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.32	mg/kg	--	0.32	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.2	mg/kg	--	1.2	mg/kg	M	--	--	ND	--	--	--	--
	PCBs as Aroclor 1254	0.73	mg/kg	--	0.73	mg/kg	M	9.3E-8	mg/kg-day	0.00002	mg/kg-day	--	--	0.0046
	(Total)													0.58
Dermal	**Metals and Organometallic Analytes**													
Absorption	Arsenic	8.8	mg/kg	0.03	8.8	mg/kg	M	3.8E-08	mg/kg-day	0.0003	mg/kg-day	--	--	0.00013
	Cadmium	9.1	mg/kg	0.001	9.1	mg/kg	M	1.3E-9	mg/kg-day	0.0005	mg/kg-day	--	--	0.0000026
	Organic Analytes													
	PAHs													
	Benz[a]anthracene	1.7	mg/kg	0.13	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	1.6	mg/kg	0.13	1.6	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	1.8	mg/kg	0.13	1.8	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.32	mg/kg	0.13	0.32	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.2	mg/kg	0.13	1.2	mg/kg	M	--	--	ND	--	--	--	--
	PCBs as Aroclor 1254	0.73	mg/kg	0.14	0.73	mg/kg	M	1.5E-8	mg/kg-day	0.00002	mg/kg-day	--	--	0.00074
	(Total)													0.00087
													Total Hazard Index Across All Exposure Routes/Pathways:	0.58

Note:
-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Undeveloped Area Surface Sediment
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent/Pre-Adolescent

Table 7.11.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Aluminum	13900	mg/kg	--	13900	mg/kg	M	2.5E-3	mg/kg-day	1.0	mg/kg-day	--	--	0.0025
	Arsenic	8.8	mg/kg	--	8.8	mg/kg	M	1.6E-6	mg/kg-day	0.0003	mg/kg-day	--	--	0.0053
	Cadmium	9.1	mg/kg	--	9.1	mg/kg	M	1.7E-6	mg/kg-day	0.01	mg/kg-day	--	--	0.00017
	Chromium	156	mg/kg	--	156	mg/kg	M	2.8E-5	mg/kg-day	0.003	mg/kg-day	--	--	0.0094
	Iron	21400	mg/kg	--	21400	mg/kg	M	3.9E-3	mg/kg-day	0.30	mg/kg-day	--	--	0.013
	Mercury (total)	1290	mg/kg	--	1290	mg/kg	M	2.3E-4	mg/kg-day	0.0003	mg/kg-day	--	--	0.78
	Methylmercury	0.13	mg/kg	--	0.13	mg/kg	M	2.3E-8	mg/kg-day	0.0001	mg/kg-day	--	--	0.00023
	Thallium	4.8	mg/kg	--	4.8	mg/kg	M	8.7E-7	mg/kg-day	0.00008	mg/kg-day	--	--	0.011
	Vanadium	69.4	mg/kg	--	69.4	mg/kg	M	1.3E-5	mg/kg-day	0.009	mg/kg-day	--	--	0.0014
	Zinc	3540	mg/kg	--	3540	mg/kg	M	6.4E-4	mg/kg-day	0.30	mg/kg-day	--	--	0.0021
	Organic Analytes													
	PAHs													
	Benz[a]anthracene	1.7	mg/kg	--	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	1.6	mg/kg	--	1.6	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	1.8	mg/kg	--	1.8	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.32	mg/kg	--	0.32	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.2	mg/kg	--	1.2	mg/kg	M	--	--	ND	--	--	--	--
	PCBs as Aroclor 1254	0.73	mg/kg	--	0.73	mg/kg	M	1.3E-7	mg/kg-day	0.00002	mg/kg-day	--	--	0.0066
	(Total)													0.83
Dermal Absorption	**Metals and Organometallic Analytes**													
	Arsenic	8.8	mg/kg	0.03	8.8	mg/kg	M	1.5E-07	mg/kg-day	0.0003	mg/kg-day	--	--	0.00051
	Cadmium	9.1	mg/kg	0.001	9.1	mg/kg	M	5.3E-9	mg/kg-day	0.0005	mg/kg-day	--	--	0.000011
	Organic Analytes													
	PAHs													
	Benz[a]anthracene	1.7	mg/kg	0.13	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	1.6	mg/kg	0.13	1.6	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	1.8	mg/kg	0.13	1.8	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.32	mg/kg	0.13	0.32	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.2	mg/kg	0.13	1.2	mg/kg	M	--	--	ND	--	--	--	--
	PCBs as Aroclor 1254	0.73	mg/kg	0.14	0.73	mg/kg	M	5.9E-8	mg/kg-day	0.00002	mg/kg-day	--	--	0.0030
	(Total)													0.0035
													Total Hazard Index Across All Exposure Routes/Pathways:	0.84

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Undeveloped Area Surface Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Table 7.12.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Aluminum	6157	mg/kg	--	6157	mg/kg	M	7.8E-4	mg/kg-day	1.0	mg/kg-day	--	--	0.00078
	Antimony	12.7	mg/kg	--	12.7	mg/kg	M	1.6E-6	mg/kg-day	0.0004	mg/kg-day	--	--	0.0040
	Arsenic	9.6	mg/kg	--	9.6	mg/kg	M	1.2E-6	mg/kg-day	0.0003	mg/kg-day	--	--	0.0041
	Barium	1530	mg/kg	--	1530	mg/kg	M	1.9E-4	mg/kg-day	0.07	mg/kg-day	--	--	0.0028
	Cadmium	14.9	mg/kg	--	14.9	mg/kg	M	1.9E-6	mg/kg-day	0.01	mg/kg-day	--	--	0.00019
	Chromium	390	mg/kg	--	390	mg/kg	M	5.0E-5	mg/kg-day	0.003	mg/kg-day	--	--	0.017
	Copper	587	mg/kg	--	587	mg/kg	M	7.5E-5	mg/kg-day	0.04	mg/kg-day	--	--	0.0019
	Iron	34588	mg/kg	--	34588	mg/kg	M	4.4E-3	mg/kg-day	0.30	mg/kg-day	--	--	0.015
	Manganese	679	mg/kg	--	679	mg/kg	M	8.6E-5	mg/kg-day	0.047	mg/kg-day	--	--	0.0019
	Mercury (total)	507	mg/kg	--	507	mg/kg	M	6.5E-5	mg/kg-day	0.0003	mg/kg-day	--	--	0.22
	Methylmercury	0.32	mg/kg	--	0.32	mg/kg	M	4.1E-8	mg/kg-day	0.0001	mg/kg-day	--	--	0.00041
	Nickel	51.1	mg/kg	--	51.1	mg/kg	M	6.5E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00033
	Silver	22.1	mg/kg	--	22.1	mg/kg	M	2.8E-6	mg/kg-day	0.005	mg/kg-day	--	--	0.00056
	Thallium	4.2	mg/kg	--	4.2	mg/kg	M	5.3E-7	mg/kg-day	0.00008	mg/kg-day	--	--	0.0067
	Vanadium	73.1	mg/kg	--	73.1	mg/kg	M	9.3E-6	mg/kg-day	0.009	mg/kg-day	--	--	0.0010
	Zinc	18443	mg/kg	--	18443	mg/kg	M	2.3E-3	mg/kg-day	0.30	mg/kg-day	--	--	0.0078
	Organic Analytes													
	Bis[2-ethylhexyl]phthalate	49	mg/kg	--	49	mg/kg	M	6.2E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00031
	PAHs													
	Benz[a]anthracene	2.4	mg/kg	--	2.4	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	2.8	mg/kg	--	2.8	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	3.2	mg/kg	--	3.2	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.90	mg/kg	--	0.90	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	--	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Naphthalene	5.1	mg/kg	--	5.1	mg/kg	M	6.5E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.000032
	2-Methylnaphthalene	2.5	mg/kg	--	2.5	mg/kg	M	3.1E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.000016
	PCBs as Aroclor 1254	4.4	mg/kg	--	4.4	mg/kg	M	5.6E-7	mg/kg-day	0.00002	mg/kg-day	--	--	0.028
	(Total)													0.31
Dermal Absorption	**Metals and Organometallic Analytes**													
	Arsenic	9.6	mg/kg	0.03	9.6	mg/kg	M	4.2E-08	mg/kg-day	0.0003	mg/kg-day	--	--	0.00014
	Cadmium	14.9	mg/kg	0.001	14.9	mg/kg	M	2.2E-9	mg/kg-day	0.0005	mg/kg-day	--	--	0.0000043
	Organic Analytes													
	Bis[2-ethylhexyl]phthalate	49	mg/kg	0.10	49	mg/kg	M	7.0E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.000035
	PAHs													
	Benz[a]anthracene	2.4	mg/kg	0.13	2.4	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	2.8	mg/kg	0.13	2.8	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	3.2	mg/kg	0.13	3.2	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.90	mg/kg	0.13	0.90	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	0.13	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Naphthalene	5.1	mg/kg	0.13	5.1	mg/kg	M	9.6E-8	mg/kg-day	0.02	mg/kg-day	--	--	0.0000048
	2-Methylnaphthalene	2.5	mg/kg	0.13	2.5	mg/kg	M	4.7E-8	mg/kg-day	0.02	mg/kg-day	--	--	0.0000023
	PCBs as Aroclor 1254	4.4	mg/kg	0.14	4.4	mg/kg	M	8.9E-8	mg/kg-day	0.00002	mg/kg-day	--	--	0.0045
	(Total)													0.0047
												Total Hazard Index Across All Exposure Routes/Pathways:		0.31

Note:
-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Undeveloped Area Surface Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent/Pre-Adolescent

Table 7.13.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Aluminum	6157	mg/kg	--	6157	mg/kg	M	1.1E-3	mg/kg-day	1.0	mg/kg-day	--	--	0.0011
	Antimony	12.7	mg/kg	--	12.7	mg/kg	M	2.3E-6	mg/kg-day	0.0004	mg/kg-day	--	--	0.0058
	Arsenic	9.6	mg/kg	--	9.6	mg/kg	M	1.7E-6	mg/kg-day	0.0003	mg/kg-day	--	--	0.0058
	Barium	1530	mg/kg	--	1530	mg/kg	M	2.8E-4	mg/kg-day	0.07	mg/kg-day	--	--	0.0040
	Cadmium	14.9	mg/kg	--	14.9	mg/kg	M	2.7E-6	mg/kg-day	0.01	mg/kg-day	--	--	0.00027
	Chromium	390	mg/kg	--	390	mg/kg	M	7.1E-5	mg/kg-day	0.003	mg/kg-day	--	--	0.024
	Copper	587	mg/kg	--	587	mg/kg	M	1.1E-4	mg/kg-day	0.04	mg/kg-day	--	--	0.0027
	Iron	34588	mg/kg	--	34588	mg/kg	M	6.3E-3	mg/kg-day	0.30	mg/kg-day	--	--	0.021
	Manganese	679	mg/kg	--	679	mg/kg	M	1.2E-4	mg/kg-day	0.047	mg/kg-day	--	--	0.0026
	Mercury (total)	507	mg/kg	--	507	mg/kg	M	9.2E-5	mg/kg-day	0.0003	mg/kg-day	--	--	0.31
	Methylmercury	0.32	mg/kg	--	0.32	mg/kg	M	5.9E-8	mg/kg-day	0.0001	mg/kg-day	--	--	0.00059
	Nickel	51.1	mg/kg	--	51.1	mg/kg	M	9.3E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00046
	Silver	22.1	mg/kg	--	22.1	mg/kg	M	4.0E-6	mg/kg-day	0.005	mg/kg-day	--	--	0.00080
	Thallium	4.2	mg/kg	--	4.2	mg/kg	M	7.6E-7	mg/kg-day	0.00008	mg/kg-day	--	--	0.010
	Vanadium	73.1	mg/kg	--	73.1	mg/kg	M	1.3E-5	mg/kg-day	0.009	mg/kg-day	--	--	0.0015
	Zinc	18443	mg/kg	--	18443	mg/kg	M	3.4E-3	mg/kg-day	0.30	mg/kg-day	--	--	0.011
	Organic Analytes													
	Bis[2-ethylhexyl]phthalate	49	mg/kg	--	49	mg/kg	M	8.8E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00044
	PAHs													
	Benz[a]anthracene	2.4	mg/kg	--	2.4	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	2.8	mg/kg	--	2.8	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	3.2	mg/kg	--	3.2	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.90	mg/kg	--	0.90	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	--	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Naphthalene	5.1	mg/kg	--	5.1	mg/kg	M	9.2E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.000046
	2-Methylnaphthalene	2.5	mg/kg	--	2.5	mg/kg	M	4.5E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.000022
	PCBs as Aroclor 1254	4.4	mg/kg	--	4.4	mg/kg	M	8.0E-7	mg/kg-day	0.00002	mg/kg-day	--	--	0.040
	(Total)													0.44
Dermal Absorption	**Metals and Organometallic Analytes**													
	Arsenic	9.6	mg/kg	0.03	9.6	mg/kg	M	1.7E-07	mg/kg-day	0.0003	mg/kg-day	--	--	0.00056
	Cadmium	14.9	mg/kg	0.001	14.9	mg/kg	M	8.7E-9	mg/kg-day	0.0005	mg/kg-day	--	--	0.000017
	Organic Analytes													
	Bis[2-ethylhexyl]phthalate	49	mg/kg	0.10	49	mg/kg	M	2.8E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00014
	PAHs													
	Benz[a]anthracene	2.4	mg/kg	0.13	2.4	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	2.8	mg/kg	0.13	2.8	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	3.2	mg/kg	0.13	3.2	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.90	mg/kg	0.13	0.90	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	0.13	1.7	mg/kg	M	--	--	ND	--	--	--	--
	Naphthalene	5.1	mg/kg	0.13	5.1	mg/kg	M	3.8E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.000019
	2-Methylnaphthalene	2.5	mg/kg	0.13	2.5	mg/kg	M	1.9E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.0000093
	PCBs as Aroclor 1254	4.4	mg/kg	0.14	4.4	mg/kg	M	3.6E-7	mg/kg-day	0.00002	mg/kg-day	--	--	0.018
	(Total)													0.019
													Total Hazard Index Across All Exposure Routes/Pathways:	0.46

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d). Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure (U.S. EPA 2001).
[c]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Undeveloped Area Subsurface Soil (1-20 ft.)
Receptor Population: Construction Worker
Receptor Age: Adult

Table 7.14.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Aluminum	13615	mg/kg	--	13615	mg/kg	M	2.7E-5	mg/kg-day	1.0	mg/kg-day	--	--	0.000027
	Antimony	14.5	mg/kg	--	14.5	mg/kg	M	2.8E-8	mg/kg-day	0.0004	mg/kg-day	--	--	0.000071
	Arsenic	22.0	mg/kg	--	22.0	mg/kg	M	4.3E-8	mg/kg-day	0.0003	mg/kg-day	--	--	0.00014
	Barium	1172	mg/kg	--	1172	mg/kg	M	2.3E-6	mg/kg-day	0.07	mg/kg-day	--	--	0.000033
	Cadmium	12.1	mg/kg	--	12.1	mg/kg	M	2.4E-8	mg/kg-day	0.01	mg/kg-day	--	--	0.0000024
	Chromium	308	mg/kg	--	308	mg/kg	M	6.0E-7	mg/kg-day	0.003	mg/kg-day	--	--	0.00020
	Copper	956	mg/kg	--	956	mg/kg	M	1.9E-6	mg/kg-day	0.04	mg/kg-day	--	--	0.000047
	Iron	75160	mg/kg	--	75160	mg/kg	M	1.5E-4	mg/kg-day	0.30	mg/kg-day	--	--	0.00049
	Manganese	811	mg/kg	--	811	mg/kg	M	1.6E-6	mg/kg-day	0.047	mg/kg-day	--	--	0.000034
	Mercury (total)	736	mg/kg	--	736	mg/kg	M	1.4E-6	mg/kg-day	0.0003	mg/kg-day	--	--	0.0048
	Methylmercury	0.0074	mg/kg	--	0.0074	mg/kg	M	1.5E-11	mg/kg-day	0.0001	mg/kg-day	--	--	0.00000015
	Nickel	82.0	mg/kg	--	82.0	mg/kg	M	1.6E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.0000080
	Selenium	4.5	mg/kg	--	4.5	mg/kg	M	8.8E-9	mg/kg-day	0.005	mg/kg-day	--	--	0.0000018
	Silver	37.3	mg/kg	--	37.3	mg/kg	M	7.3E-8	mg/kg-day	0.005	mg/kg-day	--	--	0.000015
	Thallium	2.6	mg/kg	--	2.6	mg/kg	M	5.1E-9	mg/kg-day	0.00008	mg/kg-day	--	--	0.000064
	Vanadium	127	mg/kg	--	127	mg/kg	M	2.5E-7	mg/kg-day	0.009	mg/kg-day	--	--	0.000028
	Zinc	4687	mg/kg	--	4687	mg/kg	M	9.2E-6	mg/kg-day	0.30	mg/kg-day	--	--	0.000031
	Organic Analytes													
	Carbazole	0.89	mg/kg	--	0.89	mg/kg	M	--	--	ND	--	--	--	--
	Toluene	7.3	mg/kg	--	7.3	mg/kg	M	1.4E-8	mg/kg-day	0.2	mg/kg-day	--	--	0.000000071
	Xylenes	11	mg/kg	--	11	mg/kg	M	2.2E-8	mg/kg-day	0.2	mg/kg-day	--	--	0.00000011
	PAHs													
	2-Methylnaphthalene	0.45	mg/kg	--	0.45	mg/kg	M	8.8E-10	mg/kg-day	0.02	mg/kg-day	--	--	0.000000044
	Benz[a]anthracene	2.3	mg/kg	--	2.3	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	1.9	mg/kg	--	1.9	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	2.5	mg/kg	--	2.5	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[ghi]perylene	0.83	mg/kg	--	0.83	mg/kg	M	1.6E-9	mg/kg-day	0.020	mg/kg-day	--	--	0.000000081
	Benzo[k]fluoranthene	0.74	mg/kg	--	0.74	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.26	mg/kg	--	0.26	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	0.86	mg/kg	--	0.86	mg/kg	M	--	--	ND	--	--	--	--
	Naphthalene	0.85	mg/kg	--	0.85	mg/kg	M	1.7E-9	mg/kg-day	0.02	mg/kg-day	--	--	0.000000083
	PCBs (as Aroclor 1254)	4.4	mg/kg	--	4.4	mg/kg	M	8.6E-9	mg/kg-day	0.00002	mg/kg-day	--	--	0.00043
	(Total)													0.0064

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Undeveloped Area Subsurface Soil (1-20 ft.)
Receptor Population: Construction Worker
Receptor Age: Adult

Table 7.14.Central Tendency (continued)
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	**Metals and Organometallic Analytes**													
Absorption	Arsenic	22.0	mg/kg	0.03	22.0	mg/kg	M	2.1E-07	mg/kg-day	0.0003	mg/kg-day	--	--	0.00071
	Cadmium	12.1	mg/kg	0.001	12.1	mg/kg	M	3.9E-09	mg/kg-day	0.0005	mg/kg-day	--	--	0.0000078
	Organic Analytes													
	Carbazole	0.89	mg/kg	0.10	0.89	mg/kg	M	--	--	ND	--	--	--	--
	PAHs													
	2-Methylnaphthalene	0.45	mg/kg	0.13	0.45	mg/kg	M	1.9E-08	mg/kg-day	0.02	mg/kg-day	--	--	0.00000094
	Benz[a]anthracene	2.3	mg/kg	0.13	2.3	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[a]pyrene	1.9	mg/kg	0.13	1.9	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[b]fluoranthene	2.5	mg/kg	0.13	2.5	mg/kg	M	--	--	ND	--	--	--	--
	Benzo[ghi]perylene	0.83	mg/kg	0.13	0.83	mg/kg	M	3.5E-08	mg/kg-day	0.02	mg/kg-day	--	--	0.0000017
	Benzo[k]fluoranthene	0.74	mg/kg	0.13	0.74	mg/kg	M	--	--	ND	--	--	--	--
	Dibenz[a,h]anthracene	0.26	mg/kg	0.13	0.26	mg/kg	M	--	--	ND	--	--	--	--
	Indeno[1,2,3-cd]pyrene	0.86	mg/kg	0.13	0.86	mg/kg	M	--	--	ND	--	--	--	--
	Naphthalene	0.85	mg/kg	0.13	0.85	mg/kg	M	3.5E-08	mg/kg-day	0.02	mg/kg-day	--	--	0.0000018
	PCBs (as Aroclor 1254)	4.4	mg/kg	0.14	4.4	mg/kg	M	2.0E-07	mg/kg-day	0.00002	mg/kg-day	--	--	0.010
	(Total)													0.011
													Total Hazard Index Across All Exposure Routes/Pathways:	0.017

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - No reference dose established by EPA.
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Undeveloped Area Surface Water
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Table 7.15.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Iron	2.6	mg/L	--	2.6	mg/L	M	4.0E-5	mg/kg-day	0.3	mg/kg-day	--	--	0.00013
	Manganese	0.41	mg/L	--	0.41	mg/L	M	6.3E-6	mg/kg-day	0.047	mg/kg-day	--	--	0.00014
	Mercury (total)	0.018	mg/L	--	0.018	mg/L	M	2.7E-7	mg/kg-day	0.0003	mg/kg-day	--	--	0.00090
	Methylmercury	2.8E-6	mg/L	--	2.8E-6	mg/L	M	4.2E-11	mg/kg-day	0.0001	mg/kg-day	--	--	0.00000042
	(Total)													0.0012
Dermal Absorption	**Metals and Organometallic Analytes**													
	Iron	2.6	mg/L	0.001	2.6	mg/L	M	1.9E-5	mg/kg-day	0.3	mg/kg-day	--	--	0.000063
	Manganese	0.41	mg/L	0.001	0.41	mg/L	M	3.0E-6	mg/kg-day	0.0019	mg/kg-day	--	--	0.0016
	Mercury (total)	0.018	mg/L	0.001	0.018	mg/L	M	1.3E-7	mg/kg-day	0.000021	mg/kg-day	--	--	0.0061
	Methylmercury	2.8E-6	mg/L	0.001	2.8E-6	mg/L	M	2.0E-11	mg/kg-day	0.0001	mg/kg-day	--	--	0.00000020
	(Total)													0.0077
													Total Hazard Index Across All Exposure Routes/Pathways:	0.0089

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Undeveloped Area Surface Water
Receptor Population: Trespasser
Receptor Age: Adolescent/Pre-Adolescent

Table 7.16.Central Tendency
Calculation of Noncancer Hazards
Adult Surface Water Exposure: Central Tendency Recreational Scenario
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Iron	2.6	mg/L	--	2.6	mg/L	M	5.7E-5	mg/kg-day	0.3	mg/kg-day	--	--	0.00019
	Manganese	0.41	mg/L	--	0.41	mg/L	M	9.0E-6	mg/kg-day	0.047	mg/kg-day	--	--	0.00019
	Mercury (total)	0.018	mg/L	--	0.018	mg/L	M	3.8E-7	mg/kg-day	0.0003	mg/kg-day	--	--	0.0013
	Methylmercury	2.8E-6	mg/L	--	2.8E-6	mg/L	M	6.0E-11	mg/kg-day	0.0001	mg/kg-day	--	--	0.00000060
	(Total)													0.0017
Dermal Absorption	**Metals and Organometallic Analytes**													
	Iron	2.6	mg/L	0.001	2.6	mg/L	M	1.9E-5	mg/kg-day	0.3	mg/kg-day	--	--	0.000063
	Manganese	0.41	mg/L	0.001	0.41	mg/L	M	3.0E-6	mg/kg-day	0.0019	mg/kg-day	--	--	0.0016
	Mercury (total)	0.018	mg/L	0.001	0.018	mg/L	M	1.3E-7	mg/kg-day	0.000021	mg/kg-day	--	--	0.0061
	Methylmercury	2.8E-6	mg/L	0.001	2.8E-6	mg/L	M	2.0E-11	mg/kg-day	0.0001	mg/kg-day	--	--	0.00000020
	(Total)													0.0078
													Total Hazard Index Across All Exposure Routes/Pathways:	0.0094

Note:
-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.17.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Arsenic	0.0078	mg/L	--	0.0078	mg/L	M	2.0E-5	mg/kg-day	0.0003	mg/kg-day	--	--	0.065
	Barium	0.41	mg/L	--	0.41	mg/L	M	1.0E-3	mg/kg-day	0.07	mg/kg-day	--	--	0.015
	Cadmium	0.0013	mg/L	--	0.0013	mg/L	M	3.3E-6	mg/kg-day	0.005	mg/kg-day	--	--	0.00065
	Copper	0.016	mg/L	--	0.016	mg/L	M	4.0E-5	mg/kg-day	0.04	mg/kg-day	--	--	0.0010
	Iron	15.4	mg/L	--	15.4	mg/L	M	3.9E-2	mg/kg-day	0.30	mg/kg-day	--	--	0.13
	Manganese	1.9	mg/L	--	1.9	mg/L	M	4.7E-3	mg/kg-day	0.047	mg/kg-day	--	--	0.10
	Mercury (total)	0.0083	mg/L	--	0.0083	mg/L	M	2.1E-5	mg/kg-day	0.0003	mg/kg-day	--	--	0.069
	Methylmercury	0.000023	mg/L	--	0.000023	mg/L	M	5.7E-8	mg/kg-day	0.0001	mg/kg-day	--	--	0.00057
	Nickel	0.022	mg/L	--	0.022	mg/L	M	5.6E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0028
	Thallium	0.0029	mg/L	--	0.0029	mg/L	M	7.3E-6	mg/kg-day	0.00008	mg/kg-day	--	--	0.091
	Vanadium	0.025	mg/L	--	0.025	mg/L	M	6.2E-5	mg/kg-day	0.009	mg/kg-day	--	--	0.0069
	Organic Analytes													
	Acetone	0.053	mg/L	--	0.053	mg/L	M	1.3E-4	mg/kg-day	0.9	mg/kg-day	--	--	0.00015
	Benzene	0.010	mg/L	--	0.010	mg/L	M	2.6E-5	mg/kg-day	0.004	mg/kg-day	--	--	0.0064
	Chlorobenzene	0.0081	mg/L	--	0.0081	mg/L	M	2.0E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0010
	Chloroethane	0.0063	mg/L	--	0.0063	mg/L	M	1.6E-5	mg/kg-day	0.4	mg/kg-day	--	--	0.000040
	1,2-Dichloroethene, isomers	0.0083	mg/L	--	0.0083	mg/L	M	2.1E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0010
	1,4-Dichlorobenzene	0.0040	mg/L	--	0.0040	mg/L	M	1.0E-5	mg/kg-day	0.03	mg/kg-day	--	--	0.00033
	4-Methyl-2-pentanone	0.0072	mg/L	--	0.0072	mg/L	M	1.8E-5	mg/kg-day	0.08	mg/kg-day	--	--	0.00023
	4-Methylphenol	0.0094	mg/L	--	0.0094	mg/L	M	2.4E-5	mg/kg-day	0.005	mg/kg-day	--	--	0.0047
	Toluene	0.27	mg/L	--	0.27	mg/L	M	6.8E-4	mg/kg-day	0.2	mg/kg-day	--	--	0.0034
	Xylene	0.037	mg/L	--	0.037	mg/L	M	9.3E-5	mg/kg-day	0.2	mg/kg-day	--	--	0.00047
	PAHs													
	2-Methylnaphthalene	0.0010	mg/L	--	0.0010	mg/L	M	2.5E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00013
	Naphthalene	0.013	mg/L	--	0.013	mg/L	M	3.2E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0016
	(Total)													0.50

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 7.17.Central Tendency (continued)
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal Absorption	**Metals and Organometallic Analytes**													
	Arsenic	0.0078	mg/L	0.001	0.0078	mg/L	M	2.9E-9	mg/kg-day	0.0003	mg/kg-day	--	--	0.000010
	Barium	0.41	mg/L	0.001	0.41	mg/L	M	1.5E-7	mg/kg-day	0.0049	mg/kg-day	--	--	0.000031
	Cadmium	0.0013	mg/L	0.001	0.0013	mg/L	M	4.9E-10	mg/kg-day	0.000125	mg/kg-day	--	--	0.0000039
	Copper	0.016	mg/L	0.001	0.016	mg/L	M	6.0E-9	mg/kg-day	0.0004	mg/kg-day	--	--	0.000015
	Iron	15.4	mg/L	0.001	15.4	mg/L	M	5.8E-6	mg/kg-day	0.3	mg/kg-day	--	--	0.000019
	Manganese	1.9	mg/L	0.001	1.9	mg/L	M	7.0E-7	mg/kg-day	0.0019	mg/kg-day	--	--	0.00038
	Mercury (total)	0.0083	mg/L	0.001	0.0083	mg/L	M	3.1E-9	mg/kg-day	0.000021	mg/kg-day	--	--	0.00015
	Methylmercury	0.000023	mg/L	0.001	0.000023	mg/L	M	8.5E-12	mg/kg-day	0.0001	mg/kg-day	--	--	0.000000085
	Nickel	0.022	mg/L	0.0001	0.022	mg/L	M	8.5E-10	mg/kg-day	0.0008	mg/kg-day	--	--	0.0000011
	Thallium	0.0029	mg/L	0.001	0.0029	mg/L	M	1.1E-9	mg/kg-day	0.00008	mg/kg-day	--	--	0.000014
	Vanadium	0.025	mg/L	0.001	0.025	mg/L	M	9.3E-9	mg/kg-day	0.00023	mg/kg-day	--	--	0.000040
	Organic Analytes													
	Acetone	0.053	mg/L	0.0014	0.053	mg/L	M	2.8E-8	mg/kg-day	0.9	mg/kg-day	--	--	0.000000031
	Benzene	0.010	mg/L	0.021	0.010	mg/L	M	8.1E-8	mg/kg-day	0.004	mg/kg-day	--	--	0.000020
	Chlorobenzene	0.0081	mg/L	0.041	0.0081	mg/L	M	1.3E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.0000063
	Chloroethane	0.0063	mg/L	0.0080	0.0063	mg/L	M	1.9E-8	mg/kg-day	0.4	mg/kg-day	--	--	0.000000048
	1,2-Dichloroethene, isomers	0.0083	mg/L	0.0013	0.0083	mg/L	M	4.1E-9	mg/kg-day	0.02	mg/kg-day	--	--	0.00000020
	1,4-Dichlorobenzene	0.0040	mg/L	0.062	0.0040	mg/L	M	9.4E-8	mg/kg-day	0.03	mg/kg-day	--	--	0.0000031
	4-Methyl-2-pentanone	0.0072	mg/L	0.000036	0.0072	mg/L	M	9.8E-11	mg/kg-day	0.08	mg/kg-day	--	--	0.0000000012
	4-Methylphenol	0.0094	mg/L	0.004	0.0094	mg/L	M	1.5E-8	mg/kg-day	0.005	mg/kg-day	--	--	0.0000031
	Toluene	0.27	mg/L	0.045	0.27	mg/L	M	4.6E-6	mg/kg-day	0.2	mg/kg-day	--	--	0.000023
	Xylene	0.037	mg/L	0.081	0.037	mg/L	M	1.1E-6	mg/kg-day	0.2	mg/kg-day	--	--	0.0000057
	PAHs													
	2-Methylnaphthalene	0.0010	mg/L	0.069	0.0010	mg/L	M	2.6E-8	mg/kg-day	0.02	mg/kg-day	--	--	0.0000013
	Naphthalene	0.013	mg/L	0.069	0.013	mg/L	M	3.4E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.000017
	(Total)													0.00074
													Total Hazard Index Across All Exposure Routes/Pathways:	0.50

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Resident
Receptor Age: Adult

Table 7.18.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Arsenic	0.0078	mg/L	--	0.0078	mg/L	M	1.5E-4	mg/kg-day	0.0003	mg/kg-day	--	--	0.50
	Barium	0.41	mg/L	--	0.41	mg/L	M	7.8E-3	mg/kg-day	0.07	mg/kg-day	--	--	0.11
	Cadmium	0.0013	mg/L	--	0.0013	mg/L	M	2.5E-5	mg/kg-day	0.005	mg/kg-day	--	--	0.0050
	Copper	0.016	mg/L	--	0.016	mg/L	M	3.0E-4	mg/kg-day	0.04	mg/kg-day	--	--	0.0076
	Iron	15.4	mg/L	--	15.4	mg/L	M	2.9E-1	mg/kg-day	0.3	mg/kg-day	--	--	0.98
	Manganese	1.9	mg/L	--	1.9	mg/L	M	3.6E-2	mg/kg-day	0.047	mg/kg-day	--	--	0.77
	Mercury (total)	0.0083	mg/L	--	0.0083	mg/L	M	1.6E-4	mg/kg-day	0.0003	mg/kg-day	--	--	0.53
	Methylmercury	0.000023	mg/L	--	0.000023	mg/L	M	4.3E-7	mg/kg-day	0.0001	mg/kg-day	--	--	0.0043
	Nickel	0.022	mg/L	--	0.022	mg/L	M	4.3E-4	mg/kg-day	0.02	mg/kg-day	--	--	0.021
	Thallium	0.0029	mg/L	--	0.0029	mg/L	M	5.6E-5	mg/kg-day	0.00008	mg/kg-day	--	--	0.70
	Vanadium	0.025	mg/L	--	0.025	mg/L	M	4.7E-4	mg/kg-day	0.009	mg/kg-day	--	--	0.053
	Organic Analytes													
	Acetone	0.053	mg/L	--	0.053	mg/L	M	1.0E-3	mg/kg-day	0.9	mg/kg-day	--	--	0.0011
	Benzene	0.010	mg/L	--	0.010	mg/L	M	2.0E-4	mg/kg-day	0.004	mg/kg-day	--	--	0.049
	Chlorobenzene	0.0081	mg/L	--	0.0081	mg/L	M	1.6E-4	mg/kg-day	0.02	mg/kg-day	--	--	0.0078
	Chloroethane	0.0063	mg/L	--	0.0063	mg/L	M	1.2E-4	mg/kg-day	0.4	mg/kg-day	--	--	0.00030
	1,2-Dichloroethene, isomers	0.0083	mg/L	--	0.0083	mg/L	M	1.6E-4	mg/kg-day	0.02	mg/kg-day	--	--	0.0080
	1,4-Dichlorobenzene	0.0040	mg/L	--	0.0040	mg/L	M	7.7E-5	mg/kg-day	0.03	mg/kg-day	--	--	0.0026
	4-Methyl-2-pentanone	0.0072	mg/L	--	0.0072	mg/L	M	1.4E-4	mg/kg-day	0.08	mg/kg-day	--	--	0.0017
	4-Methylphenol	0.0094	mg/L	--	0.0094	mg/L	M	1.8E-4	mg/kg-day	0.005	mg/kg-day	--	--	0.036
	Toluene	0.27	mg/L	--	0.27	mg/L	M	5.2E-3	mg/kg-day	0.2	mg/kg-day	--	--	0.026
	Xylene	0.037	mg/L	--	0.037	mg/L	M	7.1E-4	mg/kg-day	0.2	mg/kg-day	--	--	0.0036
	PAHs													
	2-Methylnaphthalene	0.0010	mg/L	--	0.0010	mg/L	M	1.9E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0010
	Naphthalene	0.013	mg/L	--	0.013	mg/L	M	2.5E-4	mg/kg-day	0.02	mg/kg-day	--	--	0.012
	(Total)													3.8

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Resident
Receptor Age: Adult

Table 7.18.Central Tendency (Continued)
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	**Metals and Organometallic Analytes**													
Absorption	Arsenic	0.0078	mg/L	0.001	0.0078	mg/L	M	1.9E-7	mg/kg-day	0.0003	mg/kg-day	--	--	0.00064
	Barium	0.41	mg/L	0.001	0.41	mg/L	M	1.0E-5	mg/kg-day	0.0049	mg/kg-day	--	--	0.0021
	Cadmium	0.0013	mg/L	0.001	0.0013	mg/L	M	3.2E-8	mg/kg-day	0.000125	mg/kg-day	--	--	0.00026
	Copper	0.016	mg/L	0.001	0.016	mg/L	M	3.9E-7	mg/kg-day	0.0004	mg/kg-day	--	--	0.0010
	Iron	15.4	mg/L	0.001	15.4	mg/L	M	3.8E-4	mg/kg-day	0.30	mg/kg-day	--	--	0.0013
	Manganese	1.9	mg/L	0.001	1.9	mg/L	M	4.6E-5	mg/kg-day	0.0019	mg/kg-day	--	--	0.025
	Mercury (total)	0.0083	mg/L	0.001	0.0083	mg/L	M	2.0E-7	mg/kg-day	0.000021	mg/kg-day	--	--	0.010
	Methylmercury	0.000023	mg/L	0.001	0.000023	mg/L	M	5.5E-10	mg/kg-day	0.0001	mg/kg-day	--	--	0.0000055
	Nickel	0.022	mg/L	0.0001	0.022	mg/L	M	5.5E-8	mg/kg-day	0.0008	mg/kg-day	--	--	0.000069
	Thallium	0.0029	mg/L	0.001	0.0029	mg/L	M	7.2E-8	mg/kg-day	0.00008	mg/kg-day	--	--	0.00089
	Vanadium	0.025	mg/L	0.001	0.025	mg/L	M	6.1E-7	mg/kg-day	0.00023	mg/kg-day	--	--	0.0026
	Organic Analytes													
	Acetone	0.053	mg/L	0.0014	0.053	mg/L	M	1.8E-6	mg/kg-day	0.9	mg/kg-day	--	--	0.0000021
	Benzene	0.010	mg/L	0.021	0.010	mg/L	M	5.3E-6	mg/kg-day	0.004	mg/kg-day	--	--	0.0013
	Chlorobenzene	0.0081	mg/L	0.041	0.0081	mg/L	M	8.2E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00041
	Chloroethane	0.0063	mg/L	0.0080	0.0063	mg/L	M	1.2E-6	mg/kg-day	0.4	mg/kg-day	--	--	0.0000031
	1,2-Dichloroethene, isomers	0.0083	mg/L	0.0013	0.0083	mg/L	M	2.7E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.000013
	1,4-Dichlorobenzene	0.0040	mg/L	0.062	0.0040	mg/L	M	6.1E-6	mg/kg-day	0.03	mg/kg-day	--	--	0.00020
	4-Methyl-2-pentanone	0.0072	mg/L	0.000036	0.0072	mg/L	M	6.4E-9	mg/kg-day	0.08	mg/kg-day	--	--	0.000000080
	4-Methylphenol	0.0094	mg/L	0.004	0.0094	mg/L	M	1.0E-6	mg/kg-day	0.005	mg/kg-day	--	--	0.00020
	Toluene	0.27	mg/L	0.045	0.27	mg/L	M	3.0E-4	mg/kg-day	0.2	mg/kg-day	--	--	0.0015
	Xylene	0.037	mg/L	0.081	0.037	mg/L	M	7.4E-5	mg/kg-day	0.2	mg/kg-day	--	--	0.00037
	PAHs													
	2-Methylnaphthalene	0.0010	mg/L	0.069	0.0010	mg/L	M	1.7E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.000085
	Naphthalene	0.013	mg/L	0.069	0.013	mg/L	M	2.2E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0011
	(Total)													0.048
													Total Hazard Index Across All Exposure Routes/Pathways:	3.9

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Dermal permiability constants from U.S. EPA (1999a).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Indoor Air -Showering/Bathing
Receptor Population: Resident
Receptor Age: Adult

Table 7.19.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[b]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	**Organic Analytes**													
	Acetone	2.9	mg/m^3	--	2.9	mg/m^3	M	3.1E-2	mg/m^3	0.35	mg/m^3	--	--	0.088
	Benzene	0.56	mg/m^3	--	0.56	mg/m^3	M	5.8E-3	mg/m^3	0.03	mg/m^3	--	--	0.19
	Bis[2-ethylhexyl]phthalate	0.18	mg/m^3	--	0.18	mg/m^3	M	1.8E-3	mg/m^3	0.077	mg/m^3	--	--	0.024
	Chlorobenzene	0.19	mg/m^3	--	0.19	mg/m^3	M	2.0E-3	mg/m^3	0.06	mg/m^3	--	--	0.033
	Chloroethane	0.23	mg/m^3	--	0.23	mg/m^3	M	2.4E-3	mg/m^3	10	mg/m^3	--	--	0.00024
	1,4-Dichlorobenzene	0.12	mg/m^3	--	0.12	mg/m^3	M	1.2E-3	mg/m^3	0.8	mg/m^3	--	--	0.0015
	1,2-Dichloroethene, isomers	0.35	mg/m^3	--	0.35	mg/m^3	M	3.7E-3	mg/m^3	0.07	mg/m^3	--	--	0.053
	4-Methyl-2-pentanone	0.28	mg/m^3	--	0.28	mg/m^3	M	2.9E-3	mg/m^3	0.08	mg/m^3	--	--	0.036
	4-Methylphenol	0.38	mg/m^3	--	0.38	mg/m^3	M	4.0E-3	mg/m^3	0.018	mg/m^3	--	--	0.23
	Toluene	1.1	mg/m^3	--	1.1	mg/m^3	M	1.2E-2	mg/m^3	0.4	mg/m^3	--	--	0.030
	Xylenes	1.7	mg/m^3	--	1.7	mg/m^3	M	1.8E-2	mg/m^3	0.1	mg/m^3	--	--	0.18
	PAHs													
	Naphthalene	0.50	mg/m^3	--	0.50	mg/m^3	M	5.2E-3	mg/m^3	0.003	mg/m^3	--	--	1.7
	2-Methylnapthalene	0.029	mg/m^3	--	0.029	mg/m^3	M	3.1E-4	mg/m^3	0.003	mg/m^3	--	--	0.10
	(Total)													2.7
													Total Hazard Index Across All Exposure Routes/Pathways:	2.7

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Andelman Model as modified by Shaum et al (1994) and site groundwater data.

[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Resident
Receptor Age: Child

Table 7.20.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	**Metals and Organometallic Analytes**													
	Arsenic	0.0078	mg/L	--	0.0078	mg/L	M	3.2E-5	mg/kg-day	0.0003	mg/kg-day	--	--	0.11
	Barium	0.41	mg/L	--	0.41	mg/L	M	1.7E-3	mg/kg-day	0.07	mg/kg-day	--	--	0.024
	Cadmium	0.0013	mg/L	--	0.0013	mg/L	M	5.3E-6	mg/kg-day	0.005	mg/kg-day	--	--	0.0011
	Copper	0.016	mg/L	--	0.016	mg/L	M	6.4E-5	mg/kg-day	0.04	mg/kg-day	--	--	0.0016
	Iron	15.4	mg/L	--	15.4	mg/L	M	6.2E-2	mg/kg-day	0.3	mg/kg-day	--	--	0.21
	Manganese	1.9	mg/L	--	1.9	mg/L	M	7.6E-3	mg/kg-day	0.047	mg/kg-day	--	--	0.16
	Mercury (total)	0.0083	mg/L	--	0.0083	mg/L	M	3.4E-5	mg/kg-day	0.0003	mg/kg-day	--	--	0.11
	Methylmercury	0.000023	mg/L	--	0.000023	mg/L	M	9.1E-8	mg/kg-day	0.0001	mg/kg-day	--	--	0.00091
	Nickel	0.022	mg/L	--	0.022	mg/L	M	9.1E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0045
	Thallium	0.0029	mg/L	--	0.0029	mg/L	M	1.2E-5	mg/kg-day	0.00008	mg/kg-day	--	--	0.15
	Vanadium	0.025	mg/L	--	0.025	mg/L	M	1.0E-4	mg/kg-day	0.009	mg/kg-day	--	--	0.011
	Organic Analytes													
	Acetone	0.053	mg/L	--	0.053	mg/L	M	2.2E-4	mg/kg-day	0.9	mg/kg-day	--	--	0.00024
	Benzene	0.010	mg/L	--	0.010	mg/L	M	4.1E-5	mg/kg-day	0.004	mg/kg-day	--	--	0.010
	Chlorobenzene	0.0081	mg/L	--	0.0081	mg/L	M	3.3E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0016
	Chloroethane	0.0063	mg/L	--	0.0063	mg/L	M	2.6E-5	mg/kg-day	0.4	mg/kg-day	--	--	0.000064
	1,2-Dichloroethene, isomers	0.0083	mg/L	--	0.0083	mg/L	M	3.4E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0017
	1,4-Dichlorobenzene	0.0040	mg/L	--	0.0040	mg/L	M	1.6E-5	mg/kg-day	0.03	mg/kg-day	--	--	0.00054
	4-Methyl-2-pentanone	0.0072	mg/L	--	0.0072	mg/L	M	2.9E-5	mg/kg-day	0.08	mg/kg-day	--	--	0.00036
	4-Methylphenol	0.0094	mg/L	--	0.0094	mg/L	M	3.8E-5	mg/kg-day	0.005	mg/kg-day	--	--	0.0076
	Toluene	0.27	mg/L	--	0.27	mg/L	M	1.1E-3	mg/kg-day	0.2	mg/kg-day	--	--	0.0055
	Xylene	0.037	mg/L	--	0.037	mg/L	M	1.5E-4	mg/kg-day	0.2	mg/kg-day	--	--	0.00075
	PAHs													
	2-Methylnaphthalene	0.0010	mg/L	--	0.0010	mg/L	M	4.1E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00020
	Naphthalene	0.013	mg/L	--	0.013	mg/L	M	5.2E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0026
	(Total)													0.81

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Resident
Receptor Age: Child

Table 7.20.Central Tendency (Continued)
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[c]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal Absorption	**Metals and Organometallic Analytes**													
	Arsenic	0.0078	mg/L	0.001	0.0078	mg/L	M	4.6E-7	mg/kg-day	0.0003	mg/kg-day	--	--	0.0015
	Barium	0.41	mg/L	0.001	0.41	mg/L	M	2.4E-5	mg/kg-day	0.0049	mg/kg-day	--	--	0.0049
	Cadmium	0.0013	mg/L	0.001	0.0013	mg/L	M	7.7E-8	mg/kg-day	0.000125	mg/kg-day	--	--	0.00061
	Copper	0.016	mg/L	0.001	0.016	mg/L	M	9.3E-7	mg/kg-day	0.0004	mg/kg-day	--	--	0.0023
	Iron	15.4	mg/L	0.001	15.4	mg/L	M	9.1E-4	mg/kg-day	0.3	mg/kg-day	--	--	0.0030
	Manganese	1.9	mg/L	0.001	1.9	mg/L	M	1.1E-4	mg/kg-day	0.0019	mg/kg-day	--	--	0.059
	Mercury (total)	0.0083	mg/L	0.001	0.0083	mg/L	M	4.9E-7	mg/kg-day	0.000021	mg/kg-day	--	--	0.023
	Methylmercury	0.000023	mg/L	0.001	0.000023	mg/L	M	1.3E-9	mg/kg-day	0.0001	mg/kg-day	--	--	0.000013
	Nickel	0.022	mg/L	0.0001	0.022	mg/L	M	1.3E-7	mg/kg-day	0.0008	mg/kg-day	--	--	0.00017
	Thallium	0.0029	mg/L	0.001	0.0029	mg/L	M	1.7E-7	mg/kg-day	0.00008	mg/kg-day	--	--	0.0021
	Vanadium	0.025	mg/L	0.001	0.025	mg/L	M	1.5E-6	mg/kg-day	0.00023	mg/kg-day	--	--	0.0062
	Organic Analytes													
	Acetone	0.053	mg/L	0.0014	0.053	mg/L	M	4.4E-6	mg/kg-day	0.9	mg/kg-day	--	--	0.0000049
	Benzene	0.010	mg/L	0.021	0.010	mg/L	M	1.3E-5	mg/kg-day	0.004	mg/kg-day	--	--	0.0032
	Chlorobenzene	0.0081	mg/L	0.041	0.0081	mg/L	M	2.0E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0010
	Chloroethane	0.0063	mg/L	0.0080	0.0063	mg/L	M	3.0E-6	mg/kg-day	0.4	mg/kg-day	--	--	0.0000074
	1,2-Dichloroethene, isomers	0.0083	mg/L	0.0013	0.0083	mg/L	M	6.4E-7	mg/kg-day	0.02	mg/kg-day	--	--	0.000032
	1,4-Dichlorobenzene	0.0040	mg/L	0.062	0.0040	mg/L	M	1.5E-5	mg/kg-day	0.03	mg/kg-day	--	--	0.00049
	4-Methyl-2-pentanone	0.0072	mg/L	0.000036	0.0072	mg/L	M	1.5E-8	mg/kg-day	0.08	mg/kg-day	--	--	0.00000019
	4-Methylphenol	0.0094	mg/L	0.004	0.0094	mg/L	M	2.4E-6	mg/kg-day	0.005	mg/kg-day	--	--	0.00048
	Toluene	0.27	mg/L	0.045	0.27	mg/L	M	7.2E-4	mg/kg-day	0.2	mg/kg-day	--	--	0.0036
	Xylene	0.037	mg/L	0.081	0.037	mg/L	M	1.8E-4	mg/kg-day	0.2	mg/kg-day	--	--	0.00089
	PAHs													
	2-Methylnaphthalene	0.0010	mg/L	0.069	0.0010	mg/L	M	4.1E-6	mg/kg-day	0.02	mg/kg-day	--	--	0.00020
	Naphthalene	0.013	mg/L	0.069	0.013	mg/L	M	5.3E-5	mg/kg-day	0.02	mg/kg-day	--	--	0.0026
	(Total)													0.12
													Total Hazard Index Across All Exposure Routes/Pathways:	0.92

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Dermal permiability constants from U.S. EPA (1999a).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Indoor Air -Showering/Bathing
Receptor Population: Resident
Receptor Age: Child

Table 7.21.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Non-cancer)	Intake (Noncancer) Units	Reference Dose[b]	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	**Organic Analytes**													
	Acetone	5.2	mg/m^3	--	5.2	mg/m^3	M	7.2E-2	mg/m^3	0.35	mg/m^3	--	--	0.21
	Benzene	0.99	mg/m^3	--	0.99	mg/m^3	M	1.4E-2	mg/m^3	0.03	mg/m^3	--	--	0.46
	Bis[2-ethylhexyl]phthalate	0.31	mg/m^3	--	0.31	mg/m^3	M	4.3E-3	mg/m^3	0.077	mg/m^3	--	--	0.056
	Chlorobenzene	0.33	mg/m^3	--	0.33	mg/m^3	M	4.6E-3	mg/m^3	0.06	mg/m^3	--	--	0.077
	Chloroethane	0.41	mg/m^3	--	0.41	mg/m^3	M	5.6E-3	mg/m^3	10	mg/m^3	--	--	0.00056
	1,4-Dichlorobenzene	0.21	mg/m^3	--	0.21	mg/m^3	M	2.9E-3	mg/m^3	0.8	mg/m^3	--	--	0.0036
	1,2-Dichloroethene, isomers	0.63	mg/m^3	--	0.63	mg/m^3	M	8.6E-3	mg/m^3	0.07	mg/m^3	--	--	0.12
	4-Methyl-2-pentanone	0.49	mg/m^3	--	0.49	mg/m^3	M	6.8E-3	mg/m^3	0.08	mg/m^3	--	--	0.085
	4-Methylphenol	0.68	mg/m^3	--	0.68	mg/m^3	M	9.4E-3	mg/m^3	0.018	mg/m^3	--	--	0.53
	Toluene	2.0	mg/m^3	--	2.0	mg/m^3	M	2.8E-2	mg/m^3	0.40	mg/m^3	--	--	0.070
	Xylenes	3.0	mg/m^3	--	3.0	mg/m^3	M	4.2E-2	mg/m^3	0.10	mg/m^3	--	--	0.42
	PAHs													
	Naphthalene	0.89	mg/m^3	--	0.89	mg/m^3	M	1.2E-2	mg/m^3	0.003	mg/m^3	--	--	4.1
	2-Methylnapthalene	0.052	mg/m^3	--	0.052	mg/m^3	M	7.2E-4	mg/m^3	0.003	mg/m^3	--	--	0.24
	(Total)													6.3
													Total Hazard Index Across All Exposure Routes/Pathways:	6.3

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Andelman Model as modified by Shaum et al (1994) and site groundwater data.
[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Current/Future
Medium: Air
Exposure Medium: Air
Exposure Point: Outdoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.1.Central Tendency
Calculation of Cancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	**Metals and Organometallic Analytes**											
	Mercury vapor	3.3E-5	mg/m^3	--	3.3E-5	mg/m^3	M	--	--	ND	--	--
											Total Risk:	0E+0
											Total Risk Across all Exposure Pathways:	0E+0

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Developed Area Indoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.2:Central Tendency
Calculation of Cancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[b]	Cancer Slope Factor Units	Cancer Risk
Inhalation	**Organic Analytes**											
	Benzene	1.3E-2	mg/m^3	--	1.3E-2	mg/m^3	M	1.1E-4	mg/kg-day	2.7E-2	$(mg/kg\text{-}day)^{-1}$	3E-6
	PAHs										--	
	2-Methylnaphthalene	1.2E-3	mg/m^3	--	1.2E-3	mg/m^3	M	--	--	ND	--	--
											Total Risk:	3E-6
											Total Risk Across all Exposure Pathways:	3E-6

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Johnson and Ettinger Model and site subsurface soil data.

[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Developed Area Indoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.3.Central Tendency
Calculation of Cancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[b]	Cancer Slope Factor Units	Cancer Risk
Inhalation	**Organic Analytes**											
	Acetone	3.6E-5	mg/m^3	--	3.6E-5	mg/m^3	M	--	--	ND	--	--
	Benzene	9.7E-5	mg/m^3	--	9.7E-5	mg/m^3	M	8.0E-7	mg/kg-day	2.7E-2	$(mg/kg\text{-}day)^{-1}$	2E-8
	Chlorobenzene	4.2E-5	mg/m^3	--	4.2E-5	mg/m^3	M	--	--	ND	--	--
	Chloroethane	3.1E-4	mg/m^3	--	3.1E-4	mg/m^3	M	2.5E-6	mg/kg-day	2.9E-3	$(mg/kg\text{-}day)^{-1}$	7E-9
	1,4-Dichlorobenzene	1.3E-5	mg/m^3	--	1.3E-5	mg/m^3	M	1.1E-7	mg/kg-day	2.2E-2	$(mg/kg\text{-}day)^{-1}$	2E-9
	1,2-Dichloroethene, isomers	8.7E-5	mg/m^3	--	8.7E-5	mg/m^3	M	--	--	ND	--	--
	4-Methyl-2-pentanone	6.3E-6	mg/m^3	--	6.3E-6	mg/m^3	M	--	--	ND	--	--
	Toluene	2.7E-3	mg/m^3	--	2.7E-3	mg/m^3	M	--	--	ND	--	--
	Xylenes	3.2E-4	mg/m^3	--	3.2E-4	mg/m^3	M	--	--	ND	--	--
	PAHs											
	Naphthalene	1.6E-5	mg/m^3	--	1.6E-5	mg/m^3	M	--	--	ND	--	--
	2-Methylnapthalene	1.1E-6	mg/m^3	--	1.1E-6	mg/m^3	M	--	--	ND	--	--
											Total Risk:	3E-8
											Total Risk Across all Exposure Pathways:	3E-8

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Johnson and Ettinger Model and site subsurface soil data.

[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b).

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Undeveloped Area Indoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.4.Central Tendency
Calculation of Cancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[b]	Cancer Slope Factor Units	Cancer Risk
Inhalation	**Organic Analytes**											
	Carbazole	6.1E-8	mg/m^3	--	6.1E-8	mg/m^3	M	5.0E-10	mg/kg-day	2.0E-2	$(mg/kg\text{-}day)^{-1}$	1E-11
	Toluene	2.6E-2	mg/m^3	--	2.6E-2	mg/m^3	M	--	--	ND	--	--
	Xylenes	4.0E-2	mg/m^3	--	4.0E-2	mg/m^3	M	--	--	ND	--	--
	PAHs											
	Benz[a]anthracene	1.4E-6	mg/m^3	--	1.4E-6	mg/m^3	M	1.2E-8	mg/kg-day	7.3E-1	$(mg/kg\text{-}day)^{-1}$	9E-9
	Benzo[a]pyrene	1.2E-6	mg/m^3	--	1.2E-6	mg/m^3	M	9.9E-9	mg/kg-day	7.3E+0	$(mg/kg\text{-}day)^{-1}$	7E-8
	Benzo[b]fluoranthene	1.6E-6	mg/m^3	--	1.6E-6	mg/m^3	M	1.3E-8	mg/kg-day	7.3E-1	$(mg/kg\text{-}day)^{-1}$	9E-9
	Benzo[ghi]perylene	5.2E-7	mg/m^3	--	5.2E-7	mg/m^3	M	--	--	ND	--	--
	Benzo[k]fluoranthene	4.6E-7	mg/m^3	--	4.6E-7	mg/m^3	M	3.8E-9	mg/kg-day	7.3E-2	$(mg/kg\text{-}day)^{-1}$	3E-10
	Dibenz[a,h]anthracene	1.6E-7	mg/m^3	--	1.6E-7	mg/m^3	M	1.4E-9	mg/kg-day	7.3E+0	$(mg/kg\text{-}day)^{-1}$	1E-8
	Indeno[1,2,3-cd]pyrene	5.4E-7	mg/m^3	--	5.4E-7	mg/m^3	M	4.5E-9	mg/kg-day	7.3E-1	$(mg/kg\text{-}day)^{-1}$	3E-9
	2-Methylnaphthalene	1.2E-3	mg/m^3	--	1.2E-3	mg/m^3	M	--	--	ND	--	--
	Naphthalene	3.0E-3	mg/m^3	--	3.0E-3	mg/m^3	M	--	--	ND	--	--
											Total Risk:	1E-7
											Total Risk Across all Exposure Pathways:	1E-7

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Johnson and Ettinger Model and site subsurface soil data.

[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Undeveloped Area Indoor Air
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.5.Central Tendency
Calculation of Cancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[b]	Cancer Slope Factor Units	Cancer Risk
Inhalation	**Organic Analytes**											
	Acetone	3.6E-5	mg/m^3	--	3.6E-5	mg/m^3	M	--	--	ND	--	--
	Benzene	9.7E-5	mg/m^3	--	9.7E-5	mg/m^3	M	8.0E-7	mg/kg-day	2.7E-2	$(mg/kg\text{-}day)^{-1}$	2E-8
	Chlorobenzene	4.2E-5	mg/m^3	--	4.2E-5	mg/m^3	M	--	--	ND	--	--
	Chloroethane	3.1E-4	mg/m^3	--	3.1E-4	mg/m^3	M	2.5E-6	mg/kg-day	2.9E-3	$(mg/kg\text{-}day)^{-1}$	7E-9
	1,4-Dichlorobenzene	1.3E-5	mg/m^3	--	1.3E-5	mg/m^3	M	1.1E-7	mg/kg-day	2.2E-2	$(mg/kg\text{-}day)^{-1}$	2E-9
	1,2-Dichloroethene, Isomers	8.7E-5	mg/m^3	--	8.7E-5	mg/m^3	M	--	--	ND	--	--
	4-Methyl-2-pentanone	6.3E-6	mg/m^3	--	6.3E-6	mg/m^3	M	--	--	ND	--	--
	Toluene	2.7E-3	mg/m^3	--	2.7E-3	mg/m^3	M	--	--	ND	--	--
	Xylenes	3.2E-4	mg/m^3	--	3.2E-4	mg/m^3	M	--	--	ND	--	--
	PAHs											
	Naphthalene	1.6E-5	mg/m^3	--	1.6E-5	mg/m^3	M	--	--	ND	--	--
	2-Methylnapthalene	1.1E-6	mg/m^3	--	1.1E-6	mg/m^3	M	--	--	ND	--	--
											Total Risk:	3E-8
											Total Risk Across all Exposure Pathways:	3E-8

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Johnson and Ettinger Model and site subsurface soil data.
[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b).

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Developed Area Surface Soil (unpaved)
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.6.Central Tendency
Calculation of Cancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Aluminum	12000	mg/kg	--	12000	mg/kg	M	--	--	ND	--	--
	Arsenic	11	mg/kg	--	11	mg/kg	M	5.1E-7	mg/kg-day	1.5E+0	(mg/kg-day)-1	8E-7
	Chromium	97	mg/kg	--	97	mg/kg	M	--	--	ND	--	--
	Copper	470	mg/kg	--	470	mg/kg	M	--	--	ND	--	--
	Iron	23000	mg/kg	--	23000	mg/kg	M	--	--	ND	--	--
	Manganese	540	mg/kg	--	540	mg/kg	M	--	--	ND	--	--
	Mercury (total)	310	mg/kg	--	310	mg/kg	M	--	--	ND	--	--
	Vanadium	140	mg/kg	--	140	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	PAHs											
	Benzo[a]pyrene	0.41	mg/kg	--	0.41	mg/kg	M	1.9E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	1E-7
	Benzo[b]fluoranthene	0.75	mg/kg	--	0.75	mg/kg	M	3.5E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	3E-8
	Dibenz[a,h]anthracene	0.071	mg/kg	--	0.071	mg/kg	M	3.3E-9	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-8
	(Total)										Total Risk:	9E-7
Dermal Absorption	**Metals and Organometallic Analytes**											
	Arsenic	11	mg/kg	0.03	11	mg/kg	M	2.0E-8	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-8
	Organic Analytes											
	PAHs											
	Benzo[a]pyrene	0.41	mg/kg	0.13	0.41	mg/kg	M	3.2E-9	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-8
	Benzo[b]fluoranthene	0.75	mg/kg	0.13	0.75	mg/kg	M	5.9E-9	mg/kg-day	7.3E-1	(mg/kg-day)-1	4E-9
	Dibenz[a,h]anthracene	0.071	mg/kg	0.13	0.071	mg/kg	M	5.6E-10	mg/kg-day	7.3E+0	(mg/kg-day)-1	4E-9
	(Total)										Total Risk:	6E-8
											Total Risk Across all Exposure Pathways:	1E-6

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit
ND - not determined by EPA or not considered to be a carcinogen

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Developed Area Surface Soil (all)
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.7.Central Tendency
Calculation of Cancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Commercial Worker Surface Soil Ingestion/Dermal Absorption

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Aluminum	12000	mg/kg	--	12000	mg/kg	M	--	--	ND	--	--
	Arsenic	11	mg/kg	--	11	mg/kg	M	5.1E-7	mg/kg-day	1.5E+0	(mg/kg-day)-1	8E-7
	Chromium	76	mg/kg	--	76	mg/kg	M	--	--	ND	--	--
	Copper	689	mg/kg	--	689	mg/kg	M	--	--	ND	--	--
	Iron	21574	mg/kg	--	21574	mg/kg	M	--	--	ND	--	--
	Manganese	399	mg/kg	--	399	mg/kg	M	--	--	ND	--	--
	Mercury (total)	2250	mg/kg	--	2250	mg/kg	M	--	--	ND	--	--
	Thallium	2.4	mg/kg	--	2.4	mg/kg	M	--	--	ND	--	--
	Vanadium	140	mg/kg	--	140	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Benzene	0.3	mg/kg	--	0.3	mg/kg	M	1.3E-8	mg/kg-day	5.5E-2	(mg/kg-day)-1	7E-10
	PAHs											
	Benz[a]anthracene	0.85	mg/kg	--	0.85	mg/kg	M	3.9E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	3E-8
	Benzo[a]pyrene	0.68	mg/kg	--	0.68	mg/kg	M	3.1E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-7
	Benzo[b]fluoranthene	1.1	mg/kg	--	1.1	mg/kg	M	4.9E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	4E-8
	Dibenz[a,h]anthracene	0.15	mg/kg	--	0.15	mg/kg	M	6.9E-9	mg/kg-day	7.3E+0	(mg/kg-day)-1	5E-8
	(Total)											1E-6
Dermal Absorption	**Metals and Organometallic Analytes**											
	Arsenic	11	mg/kg	0.03	11	mg/kg	M	2.0E-8	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-8
	Organic Analytes											
	PAHs											
	Benz[a]anthracene	0.85	mg/kg	0.13	0.85	mg/kg	M	6.8E-9	mg/kg-day	7.3E-1	(mg/kg-day)-1	5E-9
	Benzo[a]pyrene	0.68	mg/kg	0.13	0.68	mg/kg	M	5.4E-9	mg/kg-day	7.3E+0	(mg/kg-day)-1	4E-8
	Benzo[b]fluoranthene	1.1	mg/kg	0.13	1.1	mg/kg	M	8.3E-9	mg/kg-day	7.3E-1	(mg/kg-day)-1	6E-9
	Dibenz[a,h]anthracene	0.15	mg/kg	0.13	0.15	mg/kg	M	1.2E-9	mg/kg-day	7.3E+0	(mg/kg-day)-1	9E-9
	(Total)											9E-8
											Total Risk Across all Exposure Pathways:	1E-6

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit
ND - not determined by EPA or not considered to be a carcinogen

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Developed Area Subsurface Soil (1-20 ft)
Receptor Population: Construction Worker
Receptor Age: Adult

Table 8.8.Central Tendency
Calculation of Noncancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Construction Worker Subsurface Soil Ingestion/Dermal Absorption

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Arsenic	9.9	mg/kg	--	9.9	mg/kg	M	9.1E-8	mg/kg-day	1.5E+0	(mg/kg-day)-1	1E-7
	Barium	818	mg/kg	--	818	mg/kg	M	--	--	ND	--	--
	Chromium	131	mg/kg	--	131	mg/kg	M	--	--	ND	--	--
	Copper	7420	mg/kg	--	7420	mg/kg	M	--	--	ND	--	--
	Iron	35400	mg/kg	--	35400	mg/kg	M	--	--	ND	--	--
	Manganese	812	mg/kg	--	812	mg/kg	M	--	--	ND	--	--
	Mercury (total)	1269	mg/kg	--	1269	mg/kg	M	--	--	ND	--	--
	Thallium	5.4	mg/kg	--	5.4	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Benzene	2.8	mg/kg	--	2.8	mg/kg	M	2.6E-8	mg/kg-day	5.5E-2	(mg/kg-day)-1	1E-9
	PAHs											
	2-Methylnaphthalene	0	mg/kg	--	0	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	0.36	mg/kg	--	0.36	mg/kg	M	3.3E-9	mg/kg-day	2.0E+0	(mg/kg-day)-1	7E-9
	(Total)											1E-7
Dermal Absorption	**Metals and Organometallic Analytes**											
	Arsenic	9.9	mg/kg	0.03	9.9	mg/kg	M	2.7E-09	mg/kg-day	1.5E+0	(mg/kg-day)-1	4E-9
	Organic Analytes											
	PAHs											
	2-Methylnaphthalene	0.45	mg/kg	0.13	0	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	0.36	mg/kg	0.14	0.36	mg/kg	M	4.6E-10	mg/kg-day	2.0E+0	(mg/kg-day)-1	9E-10
	(Total)											5E-9
										Total Risk Across all Exposure Pathways:		2E-7

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit
ND - not determined by EPA or not considered to be a carcinogen

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Undeveloped Area Surface Soil
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.9.Central Tendency
Calculation of Cancer Risks
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Aluminum	6157	mg/kg	--	6157	mg/kg	M	--	--	ND	--	--
	Antimony	12.7	mg/kg	--	12.7	mg/kg	M	--	--	ND	--	--
	Arsenic	9.6	mg/kg	--	9.6	mg/kg	M	4.4E-7	mg/kg-day	1.5E+0	(mg/kg-day)-1	7E-7
	Barium	1530	mg/kg	--	1530	mg/kg	M	--	--	ND	--	--
	Cadmium	14.9	mg/kg	--	14.9	mg/kg	M	--	--	ND	--	--
	Chromium	390	mg/kg	--	390	mg/kg	M	--	--	ND	--	--
	Copper	587	mg/kg	--	587	mg/kg	M	--	--	ND	--	--
	Iron	34588	mg/kg	--	34588	mg/kg	M	--	--	ND	--	--
	Manganese	679	mg/kg	--	679	mg/kg	M	--	--	ND	--	--
	Mercury (total)	507	mg/kg	--	507	mg/kg	M	--	--	ND	--	--
	Methylmercury	0.32	mg/kg	--	0.32	mg/kg	M	--	--	ND	--	--
	Nickel	51.1	mg/kg	--	51.1	mg/kg	M	--	--	ND	--	--
	Silver	22.1	mg/kg	--	22.1	mg/kg	M	--	--	ND	--	--
	Thallium	4.2	mg/kg	--	4.2	mg/kg	M	--	--	ND	--	--
	Vanadium	73.1	mg/kg	--	73.1	mg/kg	M	--	--	ND	--	--
	Zinc	18443	mg/kg	--	18443	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Bis[2-ethylhexyl]phthalate	49	mg/kg	--	49	mg/kg	M	2.2E-6	mg/kg-day	1.4E-2	(mg/kg-day)-1	3E-8
	PAHs											
	Benz[a]anthracene	2.4	mg/kg	--	2.4	mg/kg	M	1.1E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	8E-8
	Benzo[a]pyrene	2.8	mg/kg	--	2.8	mg/kg	M	1.3E-7	mg/kg-day	7.3E+0	(mg/kg-day)-1	1E-6
	Benzo[b]fluoranthene	3.2	mg/kg	--	3.2	mg/kg	M	1.5E-7	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-7
	Dibenz[a,h]anthracene	0.90	mg/kg	--	0.90	mg/kg	M	4.2E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	3E-7
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	--	1.7	mg/kg	M	7.9E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	6E-8
	Naphthalene	5.1	mg/kg	--	5.1	mg/kg	M	--	--	ND	--	--
	2-Methylnaphthalene	2.5	mg/kg	--	2.5	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	4.4	mg/kg	--	4.4	mg/kg	M	2.0E-7	mg/kg-day	2.0E+0	(mg/kg-day)-1	4E-7
	(Total)											3E-6
Dermal Absorption	**Metals and Organometallic Analytes**											
	Arsenic	9.6	mg/kg	0.03	9.6	mg/kg	M	1.8E-08	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-8
	Cadmium	14.9	mg/kg	0.001	14.9	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Bis[2-ethylhexyl]phthalate	49	mg/kg	0.1	49	mg/kg	M	3.0E-07	mg/kg-day	1.4E-2	(mg/kg-day)-1	4E-9
	PAHs											
	Benz[a]anthracene	2.4	mg/kg	0.13	2.4	mg/kg	M	1.9E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-8
	Benzo[a]pyrene	2.8	mg/kg	0.13	2.8	mg/kg	M	2.2E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-7
	Benzo[b]fluoranthene	3.2	mg/kg	0.13	3.2	mg/kg	M	2.5E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-8
	Dibenz[a,h]anthracene	0.90	mg/kg	0.13	0.90	mg/kg	M	7.1E-9	mg/kg-day	7.3E+0	(mg/kg-day)-1	5E-8
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	0.13	1.72	mg/kg	M	1.4E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-8
	Naphthalene	5.1	mg/kg	0.13	5.1	mg/kg	M	--	--	ND	--	--
	2-Methylnaphthalene	2.5	mg/kg	0.13	2.5	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	4.4	mg/kg	0.14	4.4	mg/kg	M	3.8E-8	mg/kg-day	2.0E+0	(mg/kg-day)-1	8E-8
	(Total)											4E-7
											Total Risk Across all Exposure Pathways:	3E-6

Note:
-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Undeveloped Area Surface Sediment
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Table 8.10.Central Tendency
Calculation of Cancer Risks
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Aluminum	13900	mg/kg	--	13900	mg/kg	M	--	--	ND	--	--
	Arsenic	8.8	mg/kg	--	8.8	mg/kg	M	1.4E-7	mg/kg-day	1.5E+0	(mg/kg-day)-1	2E-7
	Cadmium	9.1	mg/kg	--	9.1	mg/kg	M	--	--	ND	--	--
	Chromium	156	mg/kg	--	156	mg/kg	M	--	--	ND	--	--
	Iron	21400	mg/kg	--	21400	mg/kg	M	--	--	ND	--	--
	Mercury (total)	1290	mg/kg	--	1290	mg/kg	M	--	--	ND	--	--
	Methylmercury	0.13	mg/kg	--	0.13	mg/kg	M	--	--	ND	--	--
	Thallium	4.8	mg/kg	--	4.8	mg/kg	M	--	--	ND	--	--
	Vanadium	69	mg/kg	--	69	mg/kg	M	--	--	ND	--	--
	Zinc	3540	mg/kg	--	3540	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	PAHs											
	Benz[a]anthracene	1.7	mg/kg	--	1.7	mg/kg	M	2.8E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-8
	Benzo[a]pyrene	1.6	mg/kg	--	1.6	mg/kg	M	2.6E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-7
	Benzo[b]fluoranthene	1.8	mg/kg	--	1.8	mg/kg	M	2.9E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-8
	Dibenz[a,h]anthracene	0.32	mg/kg	--	0.32	mg/kg	M	5.2E-9	mg/kg-day	7.3E+0	(mg/kg-day)-1	4E-8
	Indeno[1,2,3-cd]pyrene	1.2	mg/kg	--	1.2	mg/kg	M	2.0E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-8
	PCBs (Total)	0.73	mg/kg	--	0.73	mg/kg	M	1.2E-8	mg/kg-day	2.0E+0	(mg/kg-day)-1	2E-8
	(Total)											5E-7
Dermal Absorption	**Metals and Organometallic Analytes**											
	Arsenic	8.8	mg/kg	0.03	8.8	mg/kg	M	4.9E-09	mg/kg-day	1.5E+0	(mg/kg-day)-1	7E-9
	Cadmium	9.1	mg/kg	0.001	9.1	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	PAHs											
	Benz[a]anthracene	1.7	mg/kg	0.13	1.7	mg/kg	M	4.1E-9	mg/kg-day	7.3E-1	(mg/kg-day)-1	3E-9
	Benzo[a]pyrene	1.6	mg/kg	0.13	1.6	mg/kg	M	3.9E-9	mg/kg-day	7.3E+0	(mg/kg-day)-1	3E-8
	Benzo[b]fluoranthene	1.8	mg/kg	0.13	1.8	mg/kg	M	4.4E-9	mg/kg-day	7.3E-1	(mg/kg-day)-1	3E-9
	Dibenz[a,h]anthracene	0.32	mg/kg	0.13	0.32	mg/kg	M	7.8E-10	mg/kg-day	7.3E+0	(mg/kg-day)-1	6E-9
	Indeno[1,2,3-cd]pyrene	1.2	mg/kg	0.13	1.2	mg/kg	M	2.9E-9	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-9
	PCBs (Total)	0.73	mg/kg	0.14	0.73	mg/kg	M	1.9E-9	mg/kg-day	2.0E+0	(mg/kg-day)-1	4E-9
	(Total)											5E-8
											Total Risk Across all Exposure Pathways:	6E-7

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Undeveloped Area Surface Sediment
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent/Pre-Adolescent

Table 8.11.Central Tendency
Calculation of Cancer Risks
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Aluminum	13900	mg/kg	--	13900	mg/kg	M	--	--	ND	--	--
	Arsenic	8.8	mg/kg	--	8.8	mg/kg	M	2.1E-7	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-7
	Cadmium	9.1	mg/kg	--	9.1	mg/kg	M	--	--	ND	--	--
	Chromium	156	mg/kg	--	156	mg/kg	M	--	--	ND	--	--
	Iron	21400	mg/kg	--	21400	mg/kg	M	--	--	ND	--	--
	Mercury (total)	1290	mg/kg	--	1290	mg/kg	M	--	--	ND	--	--
	Methylmercury	0.13	mg/kg	--	0.13	mg/kg	M	--	--	ND	--	--
	Thallium	4.8	mg/kg	--	4.8	mg/kg	M	--	--	ND	--	--
	Vanadium	69.4	mg/kg	--	69.4	mg/kg	M	--	--	ND	--	--
	Zinc	14.0	mg/kg	--	14.0	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	PAHs											
	Benz[a]anthracene	1.7	mg/kg	--	1.7	mg/kg	M	4.0E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	3E-8
	Benzo[a]pyrene	1.6	mg/kg	--	1.6	mg/kg	M	3.7E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	3E-7
	Benzo[b]fluoranthene	1.8	mg/kg	--	1.8	mg/kg	M	4.2E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	3E-8
	Dibenz[a,h]anthracene	0.32	mg/kg	--	0.32	mg/kg	M	7.5E-9	mg/kg-day	7.3E+0	(mg/kg-day)-1	5E-8
	Indeno[1,2,3-cd]pyrene	1.2	mg/kg	--	1.2	mg/kg	M	2.8E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-8
	PCBs (Total)	0.73	mg/kg	--	0.73	mg/kg	M	1.7E-8	mg/kg-day	2.0E+0	(mg/kg-day)-1	3E-8
	(Total)											8E-7
Dermal	**Metals and Organometallic Analytes**											
Absorption	Arsenic	8.8	mg/kg	0.03	8.8	mg/kg	M	2.0E-08	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-8
	Cadmium	9.1	mg/kg	0.001	9.1	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	PAHs											
	Benz[a]anthracene	1.7	mg/kg	0.13	1.7	mg/kg	M	1.7E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-8
	Benzo[a]pyrene	1.6	mg/kg	0.13	1.6	mg/kg	M	1.6E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	1E-7
	Benzo[b]fluoranthene	1.8	mg/kg	0.13	1.8	mg/kg	M	1.7E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-8
	Dibenz[a,h]anthracene	0.32	mg/kg	0.13	0.32	mg/kg	M	3.1E-9	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-8
	Indeno[1,2,3-cd]pyrene	1.2	mg/kg	0.13	1.2	mg/kg	M	1.2E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	9E-9
	PCBs (Total)	0.73	mg/kg	0.14	0.73	mg/kg	M	7.6E-9	mg/kg-day	2.0E+0	(mg/kg-day)-1	2E-8
	(Total)											2E-7
											Total Risk Across all Exposure Pathways:	1E-6

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen

PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Undeveloped Area Surface Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Table 8.12.Central Tendency
Calculation of Cancer Risks
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Aluminum	6157	mg/kg	--	6157	mg/kg	M	--	--	ND	--	--
	Antimony	12.7	mg/kg	--	12.7	mg/kg	M	--	--	ND	--	--
	Arsenic	9.6	mg/kg	--	9.6	mg/kg	M	1.6E-7	mg/kg-day	1.5E+0	(mg/kg-day)-1	2E-7
	Barium	1530	mg/kg	--	1530	mg/kg	M	--	--	ND	--	--
	Cadmium	14.9	mg/kg	--	14.9	mg/kg	M	--	--	ND	--	--
	Chromium	390	mg/kg	--	390	mg/kg	M	--	--	ND	--	--
	Copper	587	mg/kg	--	587	mg/kg	M	--	--	ND	--	--
	Iron	34588	mg/kg	--	34588	mg/kg	M	--	--	ND	--	--
	Manganese	679	mg/kg	--	679	mg/kg	M	--	--	ND	--	--
	Mercury (total)	507	mg/kg	--	507	mg/kg	M	--	--	ND	--	--
	Methylmercury	0.32	mg/kg	--	0.32	mg/kg	M	--	--	ND	--	--
	Nickel	51.1	mg/kg	--	51.1	mg/kg	M	--	--	ND	--	--
	Silver	22.1	mg/kg	--	22.1	mg/kg	M	--	--	ND	--	--
	Thallium	4.2	mg/kg	--	4.2	mg/kg	M	--	--	ND	--	--
	Vanadium	73.1	mg/kg	--	73.1	mg/kg	M	--	--	ND	--	--
	Zinc	18443	mg/kg	--	18443	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Bis[2-ethylhexyl]phthalate	49	mg/kg	--	49	mg/kg	M	7.9E-7	mg/kg-day	1.4E-2	(mg/kg-day)-1	1E-8
	PAHs											
	Benz[a]anthracene	2.4	mg/kg	--	2.4	mg/kg	M	3.9E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	3E-8
	Benzo[a]pyrene	2.8	mg/kg	--	2.8	mg/kg	M	4.6E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	3E-7
	Benzo[b]fluoranthene	3.2	mg/kg	--	3.2	mg/kg	M	5.2E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	4E-8
	Dibenz[a,h]anthracene	0.90	mg/kg	--	0.90	mg/kg	M	1.5E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	1E-7
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	--	1.7	mg/kg	M	2.8E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-8
	Naphthalene	5.1	mg/kg	--	5.1	mg/kg	M	--	--	ND	--	--
	2-Methylnaphthalene	2.5	mg/kg	--	2.5	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	4.4	mg/kg	--	4.4	mg/kg	M	7.2E-8	mg/kg-day	2.0E+0	(mg/kg-day)-1	1E-7
	(Total)											9E-7
Dermal Absorption	**Metals and Organometallic Analytes**											
	Arsenic	9.6	mg/kg	0.03	9.6	mg/kg	M	5.4E-09	mg/kg-day	1.5E+0	(mg/kg-day)-1	8E-9
	Cadmium	14.9	mg/kg	0.001	14.9	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Bis[2-ethylhexyl]phthalate	49	mg/kg	0.10	49	mg/kg	M	9.0E-8	mg/kg-day	1.4E-2	(mg/kg-day)-1	1E-9
	PAHs											
	Benz[a]anthracene	2.4	mg/kg	0.13	2.4	mg/kg	M	5.8E-9	mg/kg-day	7.3E-1	(mg/kg-day)-1	4E-9
	Benzo[a]pyrene	2.8	mg/kg	0.13	2.8	mg/kg	M	6.8E-9	mg/kg-day	7.3E+0	(mg/kg-day)-1	5E-8
	Benzo[b]fluoranthene	3.2	mg/kg	0.13	3.2	mg/kg	M	7.7E-9	mg/kg-day	7.3E-1	(mg/kg-day)-1	6E-9
	Dibenz[a,h]anthracene	0.90	mg/kg	0.13	0.90	mg/kg	M	2.2E-9	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-8
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	0.13	1.7	mg/kg	M	4.2E-9	mg/kg-day	7.3E-1	(mg/kg-day)-1	3E-9
	Naphthalene	5.1	mg/kg	0.13	5.1	mg/kg	M	--	--	ND	--	--
	2-Methylnaphthalene	2.5	mg/kg	0.13	2.5	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	4.4	mg/kg	0.1	4.4	mg/kg	M	1.1E-08	mg/kg-day	2.0E+0	(mg/kg-day)-1	2E-8
	(Total)											1E-7

Total Risk Across all Exposure Pathways: 1E-6

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen

PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Undeveloped Area Surface Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent/Pre-Adolescent

Table 8.13.Central Tendency
Calculation of Cancer Risks
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Aluminum	6157	mg/kg	--	6157	mg/kg	M	--	--	ND	--	--
	Antimony	12.7	mg/kg	--	12.7	mg/kg	M	--	--	ND	--	--
	Arsenic	9.6	mg/kg	--	9.6	mg/kg	M	2.2E-7	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-7
	Barium	1530	mg/kg	--	1530	mg/kg	M	--	--	ND	--	--
	Cadmium	14.9	mg/kg	--	14.9	mg/kg	M	--	--	ND	--	--
	Chromium	390	mg/kg	--	390	mg/kg	M	--	--	ND	--	--
	Copper	587	mg/kg	--	587	mg/kg	M	--	--	ND	--	--
	Iron	34588	mg/kg	--	34588	mg/kg	M	--	--	ND	--	--
	Manganese	679	mg/kg	--	679	mg/kg	M	--	--	ND	--	--
	Mercury (total)	507	mg/kg	--	507	mg/kg	M	--	--	ND	--	--
	Methylmercury	0.32	mg/kg	--	0.32	mg/kg	M	--	--	ND	--	--
	Nickel	51.1	mg/kg	--	51.1	mg/kg	M	--	--	ND	--	--
	Silver	22.1	mg/kg	--	22.1	mg/kg	M	--	--	ND	--	--
	Thallium	4.2	mg/kg	--	4.2	mg/kg	M	--	--	ND	--	--
	Vanadium	73.1	mg/kg	--	73.1	mg/kg	M	--	--	ND	--	--
	Zinc	18443	mg/kg	--	18443.0	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Bis[2-ethylhexyl]phthalate	49	mg/kg	--	49	mg/kg	M	1.1E-6	mg/kg-day	1.4E-2	(mg/kg-day)-1	2E-8
	PAHs											
	Benz[a]anthracene	2.4	mg/kg	--	2.4	mg/kg	M	5.6E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	4E-8
	Benzo[a]pyrene	2.8	mg/kg	--	2.8	mg/kg	M	6.6E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	5E-7
	Benzo[b]fluoranthene	3.2	mg/kg	--	3.2	mg/kg	M	7.4E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	5E-8
	Dibenz[a,h]anthracene	0.90	mg/kg	--	0.90	mg/kg	M	2.1E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-7
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	--	1.7	mg/kg	M	4.0E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	3E-8
	Naphthalene	5.1	mg/kg	--	5.1	mg/kg	M	--	--	ND	--	--
	2-Methylnaphthalene	2.5	mg/kg	--	2.5	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	4.4	mg/kg	--	4.4	mg/kg	M	1.0E-7	mg/kg-day	2.0E+0	(mg/kg-day)-1	2E-7
	(Total)											1E-6
Dermal Absorption	**Metals and Organometallic Analytes**											
	Arsenic	9.6	mg/kg	0.03	9.6	mg/kg	M	2.2E-08	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-8
	Cadmium	14.9	mg/kg	0.001	14.9	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Bis[2-ethylhexyl]phthalate	49	mg/kg	0.10	49	mg/kg	M	3.6E-7	mg/kg-day	1.4E-2	(mg/kg-day)-1	5E-9
	PAHs											
	Benz[a]anthracene	2.4	mg/kg	0.13	2.4	mg/kg	M	2.3E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-8
	Benzo[a]pyrene	2.8	mg/kg	0.13	2.8	mg/kg	M	2.7E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-7
	Benzo[b]fluoranthene	3.2	mg/kg	0.13	3.2	mg/kg	M	3.1E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-8
	Dibenz[a,h]anthracene	0.90	mg/kg	0.13	0.90	mg/kg	M	8.7E-9	mg/kg-day	7.3E+0	(mg/kg-day)-1	6E-8
	Indeno[1,2,3-cd]pyrene	1.7	mg/kg	0.13	1.7	mg/kg	M	1.7E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	1E-8
	Naphthalene	5.1	mg/kg	0.13	5.1	mg/kg	M	--	--	ND	--	--
	2-Methylnaphthalene	2.5	mg/kg	0.13	2.5	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	4.4	mg/kg	0.14	4.4	mg/kg	M	4.6E-8	mg/kg-day	2.0E+0	(mg/kg-day)-1	9E-8
	(Total)											4E-7
											Total Risk Across all Exposure Pathways:	2E-6

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen

PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Undeveloped Area Subsurface Soil (1-20 ft.)
Receptor Population: Construction Worker
Receptor Age: Adult

Table 8.14.Central Tendency
Calculation of Cancer Risks
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Aluminum	13615	mg/kg	--	13615	mg/kg	M	--	--	ND	--	--
	Antimony	14.5	mg/kg	--	14.5	mg/kg	M	--	--	ND	--	--
	Arsenic	22.0	mg/kg	--	22.0	mg/kg	M	2.0E-7	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-7
	Barium	1172	mg/kg	--	1172	mg/kg	M	--	--	ND	--	--
	Cadmium	12.1	mg/kg	--	12.1	mg/kg	M	--	--	ND	--	--
	Chromium	308	mg/kg	--	308	mg/kg	M	--	--	ND	--	--
	Copper	956	mg/kg	--	956	mg/kg	M	--	--	ND	--	--
	Iron	75160	mg/kg	--	75160	mg/kg	M	--	--	ND	--	--
	Manganese	811	mg/kg	--	811	mg/kg	M	--	--	ND	--	--
	Mercury (total)	736	mg/kg	--	736	mg/kg	M	--	--	ND	--	--
	Methylmercury	0.0074	mg/kg	--	0.0074	mg/kg	M	--	--	ND	--	--
	Nickel	82	mg/kg	--	82	mg/kg	M	--	--	ND	--	--
	Selenium	4.5	mg/kg	--	4.5	mg/kg	M	--	--	ND	--	--
	Silver	37	mg/kg	--	37	mg/kg	M	--	--	ND	--	--
	Thallium	2.6	mg/kg	--	2.6	mg/kg	M	--	--	ND	--	--
	Vanadium	127	mg/kg	--	127	mg/kg	M	--	--	ND	--	--
	Zinc	4687	mg/kg	--	4687.0	mg/kg	M	--	--	ND	--	--
	Organic Analytes											
	Carbazole	0.89	mg/kg	--	0.89	mg/kg	M	8.2E-9	mg/kg-day	2.0E-2	(mg/kg-day)-1	2E-10
	Toluene	7.3	mg/kg	--	7.3	mg/kg	M	--	--	ND	--	--
	Xylenes	11.3	mg/kg	--	11.3	mg/kg	M	--	--	ND	--	--
	PAHs											
	2-Methylnaphthalene	0.45	mg/kg	--	0.45	mg/kg	M	--	--	ND	--	--
	Benz[a]anthracene	2.3	mg/kg	--	2.3	mg/kg	M	2.1E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-8
	Benzo[a]pyrene	1.9	mg/kg	--	1.9	mg/kg	M	1.8E-8	mg/kg-day	7.3E+0	(mg/kg-day)-1	1E-7
	Benzo[b]fluoranthene	2.5	mg/kg	--	2.5	mg/kg	M	2.3E-8	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-8
	Benzo[ghi]perylene	0.83	mg/kg	--	0.83	mg/kg	M	--	--	ND	--	--
	Benzo[k]fluoranthene	0.74	mg/kg	--	0.74	mg/kg	M	6.8E-9	mg/kg-day	7.3E-2	(mg/kg-day)-1	5E-10
	Dibenz[a,h]anthracene	0.26	mg/kg	--	0.26	mg/kg	M	2.4E-9	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-8
	Indeno[1,2,3-cd]pyrene	0.86	mg/kg	--	0.86	mg/kg	M	8.0E-9	mg/kg-day	7.3E-1	(mg/kg-day)-1	6E-9
	Naphthalene	0.85	mg/kg	--	0.85	mg/kg	M	--	--	ND	--	--
	PCBs (as Aroclor 1254)	4.4	mg/kg	--	4.4	mg/kg	M	4.1E-8	mg/kg-day	2.0E+0	(mg/kg-day)-1	8E-8
	(Total)											6E-07

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Undeveloped Area Subsurface Soil (1-20 ft.)
Receptor Population: Construction Worker
Receptor Age: Adult

Table 8.14.Central Tendency (Continued)
Calculation of Cancer Risks
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Absorption Factor[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Dermal	**Metals and Organometallic Analytes**											
Absorption	Arsenic	22.0	mg/kg	0.03	22.0	mg/kg	M	6.1E-9	mg/kg-day	1.5E+0	(mg/kg-day)-1	9E-09
	Cadmium	12.1	mg/kg	0.001	12.1	mg/kg	M	--	--	ND	--	--
	Organic Analytes							0.0E+0				
	Carbazole	0.89	mg/kg	0.10	0.89	mg/kg	M	8.2E-10	mg/kg-day	2.0E-2	(mg/kg-day)-1	2E-11
	PAHs											
	2-Methylnaphthalene	0.45	mg/kg	0.13	0.45	mg/kg	M	--	--	ND	--	--
	Benz[a]anthracene	2.3	mg/kg	0.13	2.3	mg/kg	M	2.8E-9	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-9
	Benzo[a]pyrene	1.9	mg/kg	0.13	1.9	mg/kg	M	2.3E-9	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-8
	Benzo[b]fluoranthene	2.5	mg/kg	0.13	2.5	mg/kg	M	3.0E-9	mg/kg-day	7.3E-1	(mg/kg-day)-1	2E-9
	Benzo[ghi]perylene	0.83	mg/kg	0.13	0.83	mg/kg	M	--	--	ND	--	--
	Benzo[k]fluoranthene	0.74	mg/kg	0.13	0.74	mg/kg	M	8.8E-10	mg/kg-day	7.3E-2	(mg/kg-day)-1	6E-11
	Dibenz[a,h]anthracene	0.26	mg/kg	0.13	0.26	mg/kg	M	3.2E-10	mg/kg-day	7.3E+0	(mg/kg-day)-1	2E-9
	Indeno[1,2,3-cd]pyrene	0.86	mg/kg	0.13	0.86	mg/kg	M	1.0E-9	mg/kg-day	7.3E-1	(mg/kg-day)-1	8E-10
	Naphthalene	0.85	mg/kg	0.13	0.8	mg/kg	M	--	--	ND	--	--
	PCBs (Total)	4.4	mg/kg	0.14	4.4	mg/kg	M	5.7E-9	mg/kg-day	2.0E+0	(mg/kg-day)-1	1E-8
	(Total)											4E-8
											Total Risk Across all Exposure Pathways:	6E-7

PAHs - Polycyclic aromatic hydrocarbons

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PAHs - Polycyclic aromatic hydrocarbons
PCBs - Polychlorinated biphenyls
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001). Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Undeveloped Area Surface Water
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Table 8.15.Central Tendency
Calculation of Cancer Risks
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Iron	2.6	mg/L	--	2.6	mg/L	M	--	--	ND	--	--
	Manganese	0.41	mg/L	--	0.41	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.018	mg/L	--	0.018	mg/L	M	--	--	ND	--	--
	Methylmercury	2.8E-6	mg/L	--	2.8E-6	mg/L	M	--	--	ND	--	--
	(Total)											0E+0
Dermal Absorption	**Metals and Organometallic Analytes**											
	Iron	2.6	mg/L	0.001	2.6	mg/L	M	--	--	ND	--	--
	Manganese	0.41	mg/L	0.001	0.41	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.018	mg/L	0.001	0.018	mg/L	M	--	--	ND	--	--
	Methylmercury	2.8E-6	mg/L	0.001	2.8E-6	mg/L	M	--	--	ND	--	--
	(Total)											0E+0
										Total Risk Across all Exposure Pathways:		0E+0

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Undeveloped Area Surface Water
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent/Pre-Adolescent

Table 8.16.Central Tendency
Calculation of Cancer Risks
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Iron	2.6	mg/L	--	2.6	mg/L	M	--	--	ND	--	--
	Manganese	0.41	mg/L	--	0.41	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.018	mg/L	--	0.018	mg/L	M	--	--	ND	--	--
	Methylmercury	2.8E-6	mg/L	--	2.8E-6	mg/L	M	--	--	ND	--	--
	(Total)											0E+0
Dermal Absorption	**Metals and Organometallic Analytes**											
	Iron	2.6	mg/L	0.001	2.6	mg/L	M	--	--	ND	--	--
	Manganese	0.41	mg/L	0.001	0.41	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.018	mg/L	0.001	0.018	mg/L	M	--	--	ND	--	--
	Methylmercury	2.8E-6	mg/L	0.001	2.8E-6	mg/L	M	--	--	ND	--	--
	(Total)											0E+0
										Total Risk Across all Exposure Pathways:		0E+0

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.17.Central Tendency
Calculation of Cancer Risks
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Arsenic	0.0078	mg/L	--	0.0078	mg/L	M	2.5E-6	mg/kg-day	1.5E+0	(mg/kg-day)-1	4E-6
	Barium	0.41	mg/L	--	0.41	mg/L	M	--	--	ND	--	--
	Cadmium	0.0013	mg/L	--	0.0013	mg/L	M	--	--	ND	--	--
	Copper	0.016	mg/L	--	0.016	mg/L	M	--	--	ND	--	--
	Iron	15.4	mg/L	--	15.4	mg/L	M	--	--	ND	--	--
	Manganese	1.9	mg/L	--	1.9	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.0083	mg/L	--	0.0083	mg/L	M	--	--	ND	--	--
	Methylmercury	0.000023	mg/L	--	0.000023	mg/L	M	--	--	ND	--	--
	Nickel	0.022	mg/L	--	0.022	mg/L	M	--	--	ND	--	--
	Thallium	0.0029	mg/L	--	0.0029	mg/L	M	--	--	ND	--	--
	Vanadium	0.025	mg/L	--	0.025	mg/L	M	--	--	ND	--	--
	Organic Analytes											
	Acetone	0.053	mg/L	--	0.053	mg/L	M	--	--	ND	--	--
	Benzene	0.010	mg/L	--	0.010	mg/L	M	3.3E-6	mg/kg-day	5.5E-2	(mg/kg-day)-1	2E-7
	Chlorobenzene	0.0081	mg/L	--	0.0081	mg/L	M	--	--	ND	--	--
	Chloroethane	0.0063	mg/L	--	0.0063	mg/L	M	2.0E-6	mg/kg-day	2.9E-3	(mg/kg-day)-1	6E-9
	1,2-Dichloroethene, isomers	0.0083	mg/L	--	0.0083	mg/L	M	--	--	ND	--	--
	1,4-Dichlorobenzene	0.0040	mg/L	--	0.0040	mg/L	M	1.3E-6	mg/kg-day	2.4E-2	(mg/kg-day)-1	3E-8
	4-Methyl-2-pentanone	0.0072	mg/L	--	0.0072	mg/L	M	--	--	ND	--	--
	4-Methylphenol	0.0094	mg/L	--	0.0094	mg/L	M	--	--	ND	--	--
	Toluene	0.27	mg/L	--	0.27	mg/L	M	--	--	ND	--	--
	Xylene	0.037	mg/L	--	0.037	mg/L	M	--	--	ND	--	--
	PAHs											
	2-Methylnaphthalene	0.0010	mg/L	--	0.0010	mg/L	M	--	--	ND	--	--
	Naphthalene	0.013	mg/L	--	0.013	mg/L	M	--	--	ND	--	--
	(Total)											4E-6

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Long-term Worker
Receptor Age: Adult

Table 8.17.Central Tendency (continued)
Calculation of Cancer Risks
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Dermal Absorption	**Metals and Organometallic Analytes**											
	Arsenic	0.0078	mg/L	0.001	0.0078	mg/L	M	1.9E-10	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-10
	Barium	0.41	mg/L	0.001	0.41	mg/L	M	--	--	ND	--	--
	Cadmium	0.0013	mg/L	0.001	0.0013	mg/L	M	--	--	ND	--	--
	Copper	0.0158	mg/L	0.001	0.0158	mg/L	M	--	--	ND	--	--
	Iron	15.4	mg/L	0.001	15.4	mg/L	M	--	--	ND	--	--
	Manganese	1.9	mg/L	0.001	1.9	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.0083	mg/L	0.001	0.0083	mg/L	M	--	--	ND	--	--
	Methylmercury	0.000023	mg/L	0.001	0.000023	mg/L	M	--	--	ND	--	--
	Nickel	0.022	mg/L	0.0001	0.022	mg/L	M	--	--	ND	--	--
	Thallium	0.0029	mg/L	0.001	0.0029	mg/L	M	--	--	ND	--	--
	Vanadium	0.025	mg/L	0.001	0.025	mg/L	M	--	--	ND	--	--
	Organic Analytes											
	Acetone	0.053	mg/L	0.0014	0.053	mg/L	M	--	--	ND	--	--
	Benzene	0.010	mg/L	0.021	0.010	mg/L	M	5.2E-9	mg/kg-day	5.5E-2	(mg/kg-day)-1	3E-10
	Chlorobenzene	0.0081	mg/L	0.041	0.0081	mg/L	M	--	--	ND	--	--
	Chloroethane	0.0063	mg/L	0.008	0.0063	mg/L	M	1.2E-9	mg/kg-day	2.9E-3	(mg/kg-day)-1	4E-12
	1,2-Dichloroethene, isomers	0.0083	mg/L	0.0013	0.0083	mg/L	M	--	--	ND	--	--
	1,4-Dichlorobenzene	0.004	mg/L	0.062	0.004	mg/L	M	6.0E-9	mg/kg-day	2.4E-2	(mg/kg-day)-1	1E-10
	4-Methyl-2-pentanone	0.0072	mg/L	0.000036	0.0072	mg/L	M	--	--	ND	--	--
	4-Methylphenol	0.0094	mg/L	0.0043	0.0094	mg/L	M	--	--	ND	--	--
	Toluene	0.27	mg/L	0.045	0.27	mg/L	M	--	--	ND	--	--
	Xylene	0.037	mg/L	0.081	0.037	mg/L	M	--	--	ND	--	--
	PAHs											
	2-Methylnaphthalene	0.0010	mg/L	0.069	0.0010	mg/L	M	--	--	ND	--	--
	Naphthalene	0.013	mg/L	0.069	0.013	mg/L	M	--	--	ND	--	--
	(Total)											7E-10

PAHs - Polycyclic aromatic hydrocarbons

Total Risk Across all Exposure Pathways: 4E-6

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen

PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (2001d).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001). Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b), or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Resident
Receptor Age: Adult

Table 8.18.Central Tendency
Calculation of Cancer Risks
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Arsenic	0.0078	mg/L	--	0.0078	mg/L	M	1.9E-5	mg/kg-day	1.5E+0	(mg/kg-day)-1	3E-5
	Barium	0.41	mg/L	--	0.41	mg/L	M	--	--	ND	--	--
	Cadmium	0.0013	mg/L	--	0.0013	mg/L	M	--	--	ND	--	--
	Copper	0.016	mg/L	--	0.016	mg/L	M	--	--	ND	--	--
	Iron	15.4	mg/L	--	15.4	mg/L	M	--	--	ND	--	--
	Manganese	1.9	mg/L	--	1.9	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.0083	mg/L	--	0.0083	mg/L	M	--	--	ND	--	--
	Methylmercury	0.000023	mg/L	--	0.000023	mg/L	M	--	--	ND	--	--
	Nickel	0.022	mg/L	--	0.022	mg/L	M	--	--	ND	--	--
	Thallium	0.0029	mg/L	--	0.0029	mg/L	M	--	--	ND	--	--
	Vanadium	0.025	mg/L	--	0.025	mg/L	M	--	--	ND	--	--
	Organic Analytes											
	Acetone	0.053	mg/L	--	0.053	mg/L	M	--	--	ND	--	--
	Benzene	0.010	mg/L	--	0.010	mg/L	M	2.5E-5	mg/kg-day	5.5E-2	(mg/kg-day)-1	1E-6
	Chlorobenzene	0.0081	mg/L	--	0.0081	mg/L	M	--	--	ND	--	--
	Chloroethane	0.0063	mg/L	--	0.0063	mg/L	M	1.6E-5	mg/kg-day	2.9E-3	(mg/kg-day)-1	5E-8
	1,2-Dichloroethene, isomers	0.0083	mg/L	--	0.0083	mg/L	M	--	--	ND	--	--
	1,4-Dichlorobenzene	0.0040	mg/L	--	0.0040	mg/L	M	9.9E-6	mg/kg-day	2.4E-2	(mg/kg-day)-1	2E-7
	4-Methyl-2-pentanone	0.0072	mg/L	--	0.0072	mg/L	M	--	--	ND	--	--
	4-Methylphenol	0.0094	mg/L	--	0.0094	mg/L	M	--	--	ND	--	--
	Toluene	0.27	mg/L	--	0.27	mg/L	M	--	--	ND	--	--
	Xylene	0.037	mg/L	--	0.037	mg/L	M	--	--	ND	--	--
	PAHs											
	2-Methylnaphthalene	0.0010	mg/L	--	0.0010	mg/L	M	--	--	ND	--	--
	Naphthalene	0.013	mg/L	--	0.013	mg/L	M	--	--	ND	--	--
	(Total)											3E-5

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Resident
Receptor Age: Adult

Table 8.18.Central Tendency (Continued)
Calculation of Cancer Risks
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Dermal	**Metals and Organometallic Analytes**											
Absorption	Arsenic	0.0078	mg/L	0.001	0.0078	mg/L	M	2.5E-8	mg/kg-day	1.5E+0	(mg/kg-day)-1	4E-8
	Barium	0.41	mg/L	0.001	0.41	mg/L	M	--	--	ND	--	--
	Cadmium	0.0013	mg/L	0.001	0.0013	mg/L	M	--	--	ND	--	--
	Copper	0.016	mg/L	0.001	0.016	mg/L	M	--	--	ND	--	--
	Iron	15.4	mg/L	0.001	15.4	mg/L	M	--	--	ND	--	--
	Manganese	1.9	mg/L	0.001	1.9	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.0083	mg/L	0.001	0.0083	mg/L	M	--	--	ND	--	--
	Methylmercury	0.000023	mg/L	0.001	0.000023	mg/L	M	--	--	ND	--	--
	Nickel	0.022	mg/L	0.0001	0.022	mg/L	M	--	--	ND	--	--
	Thallium	0.0029	mg/L	0.001	0.0029	mg/L	M	--	--	ND	--	--
	Vanadium	0.025	mg/L	0.001	0.025	mg/L	M	--	--	ND	--	--
	Organic Analytes											
	Acetone	0.053	mg/L	0.0014	0.053	mg/L	M	--	--	ND	--	--
	Benzene	0.010	mg/L	0.021	0.010	mg/L	M	6.8E-7	mg/kg-day	5.5E-2	(mg/kg-day)-1	4E-8
	Chlorobenzene	0.0081	mg/L	0.041	0.0081	mg/L	M	--	--	ND	--	--
	Chloroethane	0.0063	mg/L	0.008	0.0063	mg/L	M	1.6E-7	mg/kg-day	2.9E-3	(mg/kg-day)-1	5E-10
	1,2-Dichloroethene, isomers	0.0083	mg/L	0.0013	0.0083	mg/L	M	--	--	ND	--	--
	1,4-Dichlorobenzene	0.0040	mg/L	0.062	0.0040	mg/L	M	7.9E-7	mg/kg-day	2.4E-2	(mg/kg-day)-1	2E-8
	4-Methyl-2-pentanone	0.0072	mg/L	0.000036	0.0072	mg/L	M	--	--	ND	--	--
	4-Methylphenol	0.0094	mg/L	0.0043	0.0094	mg/L	M	--	--	ND	--	--
	Toluene	0.27	mg/L	0.045	0.27	mg/L	M	--	--	ND	--	--
	Xylene	0.037	mg/L	0.081	0.037	mg/L	M	--	--	ND	--	--
	PAHs											
	2-Methylnaphthalene	0.0010	mg/L	0.069	0.0010	mg/L	M	--	--	ND	--	--
	Naphthalene	0.013	mg/L	0.069	0.013	mg/L	M	--	--	ND	--	--
	(Total)											9E-8
											Total Risk Across all Exposure Pathways:	3E-5

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
ND - not determined by EPA or not considered to be a carcinogen
UCL - upper confidence limit

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (1999a).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Indoor Air -Showering/Bathing
Receptor Population: Resident
Receptor Age: Adult

Table 8.19.Central Tendency
Calculation of Cancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[b]	Cancer Slope Factor Units	Cancer Risk
Inhalation	**Organic Analytes**											
	Acetone	2.9	mg/m^3	--	2.9	mg/m^3	M	--	--	ND	--	--
	Benzene	0.56	mg/m^3	--	0.56	mg/m^3	M	7.5E-04	mg/m^3-day	7.8E-3	m^3-day/mg	6E-6
	Bis[2-ethylhexyl]phthalate	0.18	mg/m^3	--	0.18	mg/m^3	M	2.4E-04	mg/m^3-day	4.0E-3	m^3-day/mg	9E-7
	Chlorobenzene	0.19	mg/m^3	--	0.19	mg/m^3	M	--	--	ND	--	--
	Chloroethane	0.23	mg/m^3	--	0.23	mg/m^3	M	3.1E-04	mg/m^3-day	8.3E-4	m^3-day/mg	3E-7
	1,4-Dichlorobenzene	0.12	mg/m^3	--	0.12	mg/m^3	M	1.6E-04	mg/m^3-day	6.3E-3	m^3-day/mg	1E-6
	1,2-Dichloroethene, isomers	0.02	mg/m^3	--	0.02	mg/m^3	M	--	--	ND	--	--
	4-Methyl-2-pentanone	0.28	mg/m^3	--	0.28	mg/m^3	M	--	--	ND	--	--
	4-Methylphenol	0.38	mg/m^3	--	0.38	mg/m^3	M	--	--	ND	--	--
	Toluene	1.1	mg/m^3	--	1.1	mg/m^3	M	--	--	ND	--	--
	Xylenes	1.7	mg/m^3	--	1.7	mg/m^3	M	--	--	ND	--	--
	PAHs											
	Naphthalene	0.50	mg/m^3	--	0.50	mg/m^3	M	--	--	ND	--	--
	2-Methylnapthalene	0.029	mg/m^3	--	0.029	mg/m^3	M	--	--	ND	--	--
											Total Risk:	8E-6
											Total Risk Across all Exposure Pathways:	8E-6

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Andelman Model as modified by Shaum et al (1994) and site groundwater data.

[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Resident
Receptor Age: Child

Table 8.20.Central Tendency
Calculation of Cancer Risks
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Ingestion	**Metals and Organometallic Analytes**											
	Arsenic	0.0078	mg/L	--	0.0078	mg/L	M	3.2E-5	mg/kg-day	1.5E+0	(mg/kg-day)-1	5E-5
	Barium	0.41	mg/L	--	0.41	mg/L	M	--	--	ND	--	--
	Cadmium	0.0013	mg/L	--	0.0013	mg/L	M	--	--	ND	--	--
	Copper	0.016	mg/L	--	0.016	mg/L	M	--	--	ND	--	--
	Iron	15.4	mg/L	--	15.4	mg/L	M	--	--	ND	--	--
	Manganese	1.9	mg/L	--	1.9	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.0083	mg/L	--	0.0083	mg/L	M	--	--	ND	--	--
	Methylmercury	0.000023	mg/L	--	0.000023	mg/L	M	--	--	ND	--	--
	Nickel	0.022	mg/L	--	0.022	mg/L	M	--	--	ND	--	--
	Thallium	0.0029	mg/L	--	0.0029	mg/L	M	--	--	ND	--	--
	Vanadium	0.025	mg/L	--	0.025	mg/L	M	--	--	ND	--	--
	Organic Analytes											
	Acetone	0.053	mg/L	--	0.053	mg/L	M	--	--	ND	--	--
	Benzene	0.010	mg/L	--	0.010	mg/L	M	4.1E-5	mg/kg-day	5.5E-2	(mg/kg-day)-1	2E-6
	Chlorobenzene	0.0081	mg/L	--	0.0081	mg/L	M	--	--	ND	--	--
	Chloroethane	0.0063	mg/L	--	0.0063	mg/L	M	2.6E-5	mg/kg-day	2.9E-3	(mg/kg-day)-1	7E-8
	1,2-Dichloroethene, isomers	0.0083	mg/L	--	0.0083	mg/L	M	--	--	ND	--	--
	1,4-Dichlorobenzene	0.0040	mg/L	--	0.0040	mg/L	M	1.6E-5	mg/kg-day	2.4E-2	(mg/kg-day)-1	4E-7
	4-Methyl-2-pentanone	0.0072	mg/L	--	0.0072	mg/L	M	--	--	ND	--	--
	4-Methylphenol	0.0094	mg/L	--	0.0094	mg/L	M	--	--	ND	--	--
	Toluene	0.27	mg/L	--	0.27	mg/L	M	--	--	ND	--	--
	Xylene	0.037	mg/L	--	0.037	mg/L	M	--	--	ND	--	--
	PAHs											
	2-Methylnaphthalene	0.0010	mg/L	--	0.0010	mg/L	M	--	--	ND	--	--
	Naphthalene	0.013	mg/L	--	0.013	mg/L	M	--	--	ND	--	--
	(Total)											5E-5

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater Sitewide
Receptor Population: Resident
Receptor Age: Child

Table 8.20.Central Tendency (Continued)
Calculation of Cancer Risks
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units	Dermal Permeability Constant[b]	Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[c]	Cancer Slope Factor Units	Cancer Risk
Dermal Absorption	**Metals and Organometallic Analytes**											
	Arsenic	0.0078	mg/L	0.001	0.0078	mg/L	M	3.9E-8	mg/kg-day	1.5E+0	(mg/kg-day)-1	6E-8
	Barium	0.41	mg/L	0.001	0.41	mg/L	M	--	--	ND	--	--
	Cadmium	0.0013	mg/L	0.001	0.0013	mg/L	M	--	--	ND	--	--
	Copper	0.016	mg/L	0.001	0.016	mg/L	M	--	--	ND	--	--
	Iron	15.4	mg/L	0.001	15.4	mg/L	M	--	--	ND	--	--
	Manganese	1.9	mg/L	0.001	1.9	mg/L	M	--	--	ND	--	--
	Mercury (total)	0.0083	mg/L	0.001	0.0083	mg/L	M	--	--	ND	--	--
	Methylmercury	0.000023	mg/L	0.001	0.000023	mg/L	M	--	--	ND	--	--
	Nickel	0.022	mg/L	0.0001	0.022	mg/L	M	--	--	ND	--	--
	Thallium	0.0029	mg/L	0.001	0.0029	mg/L	M	--	--	ND	--	--
	Vanadium	0.025	mg/L	0.001	0.025	mg/L	M	--	--	ND	--	--
	Organic Analytes											
	Acetone	0.05	mg/L	0.0014	0.05	mg/L	M	--	--	ND	--	--
	Benzene	0.010	mg/L	0.021	0.010	mg/L	M	1.1E-6	mg/kg-day	5.5E-2	(mg/kg-day)-1	6E-8
	Chlorobenzene	0.0081	mg/L	0.041	0.0081	mg/L	M	--	--	ND	--	--
	Chloroethane	0.0063	mg/L	0.008	0.0063	mg/L	M	2.6E-7	mg/kg-day	2.9E-3	(mg/kg-day)-1	7E-10
	1,2-Dichloroethene, isomers	0.0083	mg/L	0.0013	0.0083	mg/L	M	--	--	ND	--	--
	1,4-Dichlorobenzene	0.0040	mg/L	0.062	0.0040	mg/L	M	1.3E-6	mg/kg-day	2.4E-2	(mg/kg-day)-1	3E-8
	4-Methyl-2-pentanone	0.0072	mg/L	0.000036	0.0072	mg/L	M	--	--	ND	--	--
	4-Methylphenol	0.0094	mg/L	0.0043	0.0094	mg/L	M	--	--	ND	--	--
	Toluene	0.27	mg/L	0.045	0.27	mg/L	M	--	--	ND	--	--
	Xylene	0.037	mg/L	0.081	0.037	mg/L	M	--	--	ND	--	--
	PAHs							0.0E+0				
	2-Methylnaphthalene	0.0010	mg/L	0.069	0.0010	mg/L	M	--	--	ND	--	--
	Naphthalene	0.013	mg/L	0.069	0.013	mg/L	M	--	--	ND	--	--
	(Total)											1E-7
											Total Risk Across all Exposure Pathways:	5E-5

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
PAHs - Polycyclic aromatic hydrocarbons
UCL - upper confidence limit
ND - not determined by EPA or not considered to be a carcinogen

[a]Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.
[b]Absorption factors from U.S. EPA (1999a).
[c]Toxicity values were adjusted to account for oral absorption in order to calculate risks for dermal exposure on the basis of absorbed doses (U.S. EPA 2001).
Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a), EPA Integrated Risk Information System (IRIS) (January 2003b),
or the EPA Health Effects Assessment Summary Tables (HEAST) (July 1997a).

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Indoor Air -Showering/Bathing
Receptor Population: Resident
Receptor Age: Child

Table 8.21.Central Tendency
Calculation of Cancer Hazards
Central Tendency Exposure
Ventron/Velsicol Site OU1

Exposure Route	Chemical of Concern	Medium EPC Value[a]	Medium Units		Route EPC	Route EPC Units	EPC Applied	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor[b]	Cancer Slope Factor Units	Cancer Risk
Inhalation	**Organic Analytes**											
	Acetone	5.2	mg/m^3	--	5.2	mg/m^3	M	--	--	ND	--	--
	Benzene	0.99	mg/m^3	--	0.99	mg/m^3	M	1.2E-3	mg/m^3-day	7.8E-3	m^3-day/mg	9E-6
	Bis[2-ethylhexyl]phthalate	0.31	mg/m^3	--	0.31	mg/m^3	M	3.7E-4	mg/m^3-day	4.0E-3	m^3-day/mg	1E-6
	Chlorobenzene	0.33	mg/m^3	--	0.33	mg/m^3	M	--	--	ND	--	--
	Chloroethane	0.41	mg/m^3	--	0.41	mg/m^3	M	4.8E-4	mg/m^3-day	8.3E-4	m^3-day/mg	4E-7
	1,4-Dichlorobenzene	0.21	mg/m^3	--	0.21	mg/m^3	M	2.5E-4	mg/m^3-day	6.3E-3	m^3-day/mg	2E-6
	1,2-Dichloroethene, isomers	0.02	mg/m^3	--	0.02	mg/m^3	M	--	--	ND	--	--
	4-Methyl-2-pentanone	0.49	mg/m^3	--	0.49	mg/m^3	M	--	--	ND	--	--
	4-Methylphenol	0.68	mg/m^3	--	0.68	mg/m^3	M	--	--	ND	--	--
	Toluene	2.0	mg/m^3	--	2.0	mg/m^3	M	--	--	ND	--	--
	Xylenes	3.0	mg/m^3	--	3.0	mg/m^3	M	--	--	ND	--	--
	PAHs											
	Naphthalene	0.89	mg/m^3	--	0.89	mg/m^3	M	--	--	ND	--	--
	2-Methylnapthalene	0.052	mg/m^3	--	0.052	mg/m^3	M	--	--	ND	--	--
											Total Risk:	1E-5
											Total Risk Across all Exposure Pathways:	1E-5

Note:

-- - not applicable
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
M - medium-specific
ND - not determined by EPA or not considered to be a carcinogen
PAHs - Polycyclic aromatic hydrocarbons

[a]Values for all chemicals represent estimated indoor air concentrations derived through application of the Andelman Model as modified by Shaum et al (1994) and site groundwater data.
[b]Toxicity values obtained from either the EPA Region IX (U.S. EPA 2003a) or EPA Integrated Risk Information System (IRIS) (January 2003b). The RfD for 2-methylnaphthalene is that for naphthalene.

Table 9.1.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Current
Receptor Population: Long-term Worker - Developed Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Air	Air	Outdoor Air	Mercury vapor	NA	--	NA	--	Mercury vapor	CNS	NA	0.025	NA	0.025
			(Total)	NA	0E+0	NA	0E+0	(Total)			0.025		0.025
Subsurface Soil	Air	Indoor Air (derived from subsurface soil)	Benzene	NA	1E-5	NA	1E-5	Benzene	Hematopoietic	NA	0.17	NA	0.17
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.16	NA	0.16
			(Total)	NA	1E-5	NA	1E-5	(Total)			0.33		0.33
Groundwater	Air	Indoor Air (derived from groundwater)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.000043	NA	0.000043
			Benzene	NA	1E-7	NA	1E-7	Benzene	Hematopoietic	NA	0.0013	NA	0.0013
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.00029	NA	0.00029
			Chloroethane	NA	4E-8	NA	4E-8	Chloroethane	ND	NA	0.000012	NA	0.000012
			1,4-Dichlorobenzene	NA	1E-8	NA	1E-8	1,4-Dichlorobenzene	Increased liver weight	NA	0.0000067	NA	0.0000067
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.00051	NA	0.00051
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.000033	NA	0.000033
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.0029	NA	0.0029
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.0013	NA	0.0013
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	0.0022	NA	0.0022
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.00015	NA	0.00015
			(Total)	NA	2E-7	NA	2E-7	(Total)		NA	0.0088	NA	0.0088
Surface Soil	Surface Soil	Developed Area Surface Soil (unpaved)	Aluminum	--	NA	--	--	Aluminum	ND	0.0059	NA	--	0.0059
			Arsenic	3.E-6	NA	1E-6	4E-6	Arsenic	Skin/vascular	0.018	NA	0.0071	0.025
			Chromium	--	NA	--	--	Chromium	ND	0.016	NA	--	0.016
			Copper	--	NA	--	--	Copper	ND	0.0057	NA	--	0.0057
			Iron	--	NA	--	--	Iron	ND	0.038	NA	--	0.038
			Manganese	--	NA	--	--	Manganese	CNS	0.0057	NA	--	0.0057
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.51	NA	--	0.51
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0076	NA	--	0.0076
			Benzo[a]pyrene	5.E-7	NA	9E-7	1E-6	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	1.E-7	NA	2E-7	3E-7	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	9.E-8	NA	2E-7	2E-7	Dibenz[a,h]anthracene	ND	--	NA	--	--
			(Total)	4E-6		2E-6	6E-6	(Total)		0.60		0.0071	0.61
			Total Risk Across All Media and Exposure Routes:				2E-5		Total Hazard Index Across All Media and Exposure Routes:				1.0

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.035
Total immune HI=	0.51
Total liver HI=	0.0000067
Total cardiovascular HI=	0.025
Total blood HI=	0.16
Total body/organ weight HI=	0.0000067
Total other HI=	0.23

Table 9.2.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Receptor Population: Long-term Worker - Developed Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Air	Air	Outdoor Air	Mercury vapor	NA	--	NA	--	Mercury vapor	CNS	NA	0.025	NA	0.025
			(Total)	NA	0E+0	NA	0E+0	(Total)			0.025		0.025
Subsurface Soil	Air	Indoor Air (derived from subsurface soil)	Benzene	NA	1E-5	NA	1E-5	Benzene	Hematopoietic	NA	0.17	NA	0.17
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.16	NA	0.16
			(Total)	NA	1E-5	NA	1E-5	(Total)			0.33		0.33
Groundwater	Air	Indoor Air (derived from groundwater)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.000043	NA	0.000043
			Benzene	NA	1E-7	NA	1E-7	Benzene	Hematopoietic	NA	0.0013	NA	0.0013
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.00029	NA	0.00029
			Chloroethane	NA	4E-8	NA	4E-8	Chloroethane	ND	NA	0.000012	NA	0.000012
			1,4-Dichlorobenzene	NA	1E-8	NA	1E-8	1,4-Dichlorobenzene	Increased liver weight	NA	0.0000067	NA	0.0000067
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.0005	NA	0.0005
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.000033	NA	0.000033
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.0029	NA	0.0029
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.0013	NA	0.0013
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	0.0022	NA	0.0022
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.00015	NA	0.00015
			(Total)	NA	2E-7	NA	2E-7	(Total)		NA	0.0088	NA	0.0088
Surface Soil	Surface Soil	Developed Area Surface Soil (all)	Aluminum	--	NA	--	--	Aluminum	ND	0.0059	NA	--	0.0059
			Arsenic	3.E-6	NA	1E-6	4E-6	Arsenic	Skin/vascular	0.018	NA	0.0071	0.025
			Chromium	--	NA	--	--	Chromium	ND	0.012	NA	--	0.012
			Copper	--	NA	--	--	Copper	ND	0.0084	NA	--	0.008
			Iron	--	NA	--	--	Iron	ND	0.035	NA	--	0.035
			Manganese	--	NA	--	--	Manganese	CNS	0.0042	NA	--	0.0042
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	3.7	NA	--	3.7
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.015	NA	--	0.015
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0076	NA	--	0.0076
			Benzene	3.E-9	NA	--	3E-9	Benzene	Hematopoietic	0.000035	NA		0.000035
			Benz[a]anthracene	1.E-7	NA	2E-7	3E-7	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	9.E-7	NA	1E-6	2E-6	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	1.E-7	NA	2E-7	4E-7	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	2.E-7	NA	3E-7	5E-7	Dibenz[a,h]anthracene	ND	--	NA	--	--
			(Total)	4E-6		3E-6	8E-6	(Total)		3.8		0.0071	3.8

Table 9.2.RME (continued)
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Receptor Population: Long-term Worker - Developed Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Groundwater	Groundwater	Groundwater Sitewide	Arsenic	4E-5	NA	1E-9	4E-5	Arsenic	Skin/vascular	0.25	NA	0.000012	0.25
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.057	NA	0.000039	0.057
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.0025	NA	0.0000048	0.0025
			Copper	--	NA	--	--	Copper	ND	0.0039	NA	0.000018	0.0039
			Iron	--	NA	--	--	Iron	ND	0.50	NA	0.000024	0.50
			Manganese	--	NA	--	--	Manganese	CNS	0.39	NA	0.00047	0.39
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.27	NA	0.00018	0.27
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.0022	NA	0.00000010	0.0022
			Nickel	--	NA	--	--	Nickel	Decreased body/organ weights	0.011	NA	0.0000013	0.011
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.35	NA	0.000017	0.35
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.027	NA	0.000049	0.027
			Acetone	--	NA	--	--	Acetone	Kidney	0.00058	NA	0.000000039	0.00058
			Benzene	2E-6	NA	1E-9	2E-6	Benzene	Hematopoietic	0.025	NA	0.000025	0.025
			Chlorobenzene	--	NA	--	--	Chlorobenzene	Liver	0.0040	NA	0.0000077	0.0040
			Chloroethane	6E-8	NA	2E-11	6E-8	Chloroethane	ND	0.0002	NA	0.000000059	0.00015
			1,2-Dichloroethene, isomers	--	NA	--	--	1,2-Dichloroethene, isomers	Serum enzymes	0.0041	NA	0.00000025	0.0041
			1,4-Dichlorobenzene	3E-7	NA	7E-10	3E-7	1,4-Dichlorobenzene	ND	0.0013	NA	0.0000038	0.0013
			4-Methyl-2-pentanone	--	NA	--	--	4-Methyl-2-pentanone	ND	0.00088	NA	0.0000000015	0.00088
			4-Methylphenol	--	NA	--	--	4-Methylphenol	ND	0.018	NA	0.0000038	0.018
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.013	NA	0.000028	0.0133
			Xylene	--	NA	--	--	Xylene	Hyperactivity, body wt, mortality	0.0018	NA	0.0000070	0.0018
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.00049	NA	0.0000016	0.00049
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.0063	NA	0.000021	0.0063
			(Total)	4E-5		3E-9	4E-5	(Total)		2.0		0.00091	2.0
			Total Risk Across All Media and Exposure Routes:				7E-5		Total Hazard Index Across All Media and Exposure Routes:				6.1

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.43
Total immune HI=	3.9
Total kidney HI=	0.073
Total liver HI=	0.37
Total cardiovascular HI=	0.28
Total blood HI=	0.24
Total body/organ weight HI=	0.031
Total other HI=	0.76

Table 9.3.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Receptor Population: Long-term Worker - Undeveloped Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Air	Air	Outdoor Air	Mercury vapor	NA	--	NA	--	Mercury vapor	CNS	NA	0.025	NA	0.025
			(Total)		0E+0		0E+0	(Total)			0.025		0.025
Subsurface Soil	Air	Indoor Air (derived from subsurface soil)	Carbazole	NA	5E-11	NA	5E-11	Carbazole	ND	NA	--	NA	--
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.027	NA	0.027
			Xylenes	NA	--	NA		Xylenes	CNS	NA	0.17	NA	0.17
			Benz[a]anthracene	NA	4E-8	NA	4E-8	Benz[a]anthracene	ND	NA	--	NA	--
			Benzo[a]pyrene	NA	4E-7	NA	4E-7	Benzo[a]pyrene	ND	NA	--	NA	--
			Benzo[b]fluoranthene	NA	5E-8	NA	5E-8	Benzo[b]fluoranthene	ND	NA	--	NA	--
			Benzo[ghi]perylene	NA	--	NA	--	Benzo[ghi]perylene	Nasal effects; hyperplasia	NA	0.000071	NA	0.000071
			Benzo[k]fluoranthene	NA	1E-9	NA	1E-8	Benzo[k]fluoranthene	ND	NA	--	NA	--
			Dibenz[a,h]anthracene	NA	5E-8	NA	5E-8	Dibenz[a,h]anthracene	ND	NA	--	NA	--
			Indeno[1,2,3-cd]pyrene	NA	2E-8	NA	2E-8	Indeno[1,2,3-cd]pyrene	ND	NA	--	NA	--
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.16	NA	0.16
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	0.41	NA	0.41
			(Total)	NA	5E-7	NA	5E-7	(Total)		NA	0.76	NA	0.76
Groundwater	Air	Indoor Air (derived from groundwater)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.000043	NA	0.000043
			Benzene	NA	1E-7	NA	1E-7	Benzene	Hematopoietic	NA	0.0013	NA	0.0013
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.00029	NA	0.00029
			Chloroethane	NA	4E-8	NA	4E-8	Chloroethane	ND	NA	0.000012	NA	0.000012
			1,4-Dichlorobenzene	NA	1E-8	NA	1E-8	1,4-Dichlorobenzene	Increased liver weight	NA	0.0000067	NA	0.0000067
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.00051	NA	0.00051
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.000033	NA	0.000033
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.0029	NA	0.0029
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.0013	NA	0.0013
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	0.0022	NA	0.0022
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.00015	NA	0.00015
			(Total)	NA	2E-7	NA	2E-7	(Total)		NA	0.0088	NA	0.0088
Surface Soil	Surface Soil	Undeveloped Area Surface Soil	Aluminum	--	NA	--	--	Aluminum	ND	0.0030	NA	--	0.0030
			Antimony	--	NA	--	--	Antimony	Longevity; metabolic	0.016	NA	--	0.016
			Arsenic	3E-6	NA	1E-6	4E-6	Arsenic	Skin/vascular	0.016	NA	0.0062	0.022
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.011	NA	--	0.011
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00073	NA	0.00019	0.00092
			Chromium	--	NA	--	--	Chromium	ND	0.064	NA	--	0.064
			Copper	--	NA	--	--	Copper	ND	0.0072	NA	--	0.0072
			Iron	--	NA	--	--	Iron	ND	0.056	NA	--	0.056
			Manganese	--	NA	--	--	Manganese	CNS	0.0071	NA	--	0.0071
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.83	NA	--	0.83
			Methylmercury	--	NA	--		Methylmercury	Neurologic	0.0016	NA	--	0.0016
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.0013	NA	--	0.0013
			Silver	--	NA	--	--	Silver	Skin (argyria)	0.0022	NA	--	0.0022
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.026	NA	--	0.026
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0040	NA	--	0.0040
			Zinc	--	NA	--	--	Zinc	Blood	0.030	NA	--	0.030
			Bis[2-ethylhexyl]phthalate	1E-7	NA	2E-7	3E-7	Bis[2-ethylhexyl]phthalate	Increased liver weight	0.0012	NA	0.0016	0.0028
			Benz[a]anthracene	3E-7	NA	5E-7	8E-7	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	4E-6	NA	6E-6	1E-5	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	4E-7	NA	7E-7	1E-6	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	1E-6	NA	2E-6	3E-6	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	2E-7	NA	4E-7	6E-7	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.00012	NA	0.00021	0.00034
			2-Methylnaphthalene	--		--	--	2-Methylnaphthalene	Body weight	0.000060	NA	0.00010	0.00016
			PCBs	2E-6	NA	3E-6	4E-6	PCBs	Immunologic	0.11	NA	0.20	0.31
			(Total)	1E-5		1E-5	2E-5	(Total)		1.2		0.21	1.4

Table 9.3.RME (continued)
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Receptor Population: Long-term Worker - Undeveloped Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Groundwater	Groundwater	Groundwater Sitewide	Arsenic	4E-5	NA	1E-9	4E-5	Arsenic	Skin/vascular	0.25	NA	0.000012	0.25
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.057	NA	0.000039	0.057
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.0025	NA	0.0000048	0.0025
			Copper	--	NA	--	--	Copper	ND	0.0039	NA	0.000018	0.0039
			Iron	--	NA	--	--	Iron	ND	0.50	NA	0.000024	0.50
			Manganese	--	NA	--	--	Manganese	CNS	0.39	NA	0.00047	0.39
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.27	NA	0.00018	0.27
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.0022	NA	0.00000010	0.0022
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.011	NA	0.0000013	0.011
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.35	NA	0.000017	0.35
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.027	NA	0.000049	0.027
			Acetone	--	NA	--	--	Acetone	Kidney	0.00058	NA	0.000000039	0.00058
			Benzene	2E-6	NA	1E-9	2E-6	Benzene	Hematopoietic	0.025	NA	0.000025	0.025
			Chlorobenzene	--	NA	--	--	Chlorobenzene	Liver	0.0040	NA	0.0000077	0.0040
			Chloroethane	6E-8	NA	2E-11	6E-8	Chloroethane	ND	0.00015	NA	0.000000059	0.00015
			1,2-Dichloroethene, isomers	--	NA	--	--	1,2-Dichloroethene, isomers	Serum enzymes	0.0041	NA	0.00000025	0.0041
			1,4-Dichlorobenzene	3E-7	NA	7E-10	3E-7	1,4-Dichlorobenzene	ND	0.0013	NA	0.0000038	0.0013
			4-Methyl-2-pentanone	--	NA	--	--	4-Methyl-2-pentanone	ND	0.00088	NA	0.0000000015	0.00088
			4-Methylphenol	--	NA	--	--	4-Methylphenol	ND	0.018	NA	0.0000038	0.018
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.013	NA	0.000028	0.013
			Xylene	--	NA	--	--	Xylene	Hyperactivity, body wt, mortality	0.0018	NA	0.0000070	0.0018
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.00049	NA	0.0000016	0.00049
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.0063	NA	0.000021	0.0063
			(Total)	4E-5		3E-9	4E-5	(Total)		2.0		0.00091	2.0
			Total Risk Across All Media and Exposure Routes:				7E-5		Total Hazard Index Across All Media and Exposure Routes:				4.1

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
PCBs - Polychlorinated biphenyls
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.63
Total immune HI=	1.4
Total kidney HI=	0.072
Total liver HI=	0.39
Total cardiovascular HI=	0.28
Total skin HI=	0.0022
Total metabolic HI =	0.016
Total blood HI=	0.087
Total body/organ weight HI=	0.036
Total other HI=	1.2

Table 9.4.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Current/ Future
Receptor Population: Construction Worker - Developed Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Subsurface Soil	Subsurface Soil	Developed Area Subsurface Soil (1-20 ft depth)	Arsenic	5E-8	NA	2E-8	7E-8	Arsenic	Skin/vascular	0.0039	NA	0.0015	0.0054
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.0014	NA	--	0.0014
			Chromium	--	NA	--	--	Chromium	ND	0.0051	NA	--	0.0051
			Copper	--	NA	--	--	Copper	ND	0.022	NA	--	0.022
			Iron	--	NA	--	--	Iron	ND	0.014	NA	--	0.014
			Manganese	--	NA	--	--	Manganese	CNS	0.0020	NA	--	0.0020
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.50	NA	--	0.50
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.0079	NA	--	0.0079
			Benzene	5E-10	NA	--	5E-10	Benzene	Hematopoietic	0.000082	NA	--	0.000082
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.0000026	NA	0.0000045	0.0000072
			PCBs	2E-9	NA	4E-9	7E-9	PCBs	Immunologic	0.0021	NA	0.0039	0.0060
			(Total)	5E-8		2E-8	8E-8	(Total)		0.55		0.0054	0.56
			Total Risk Across All Media and Exposure Routes:				8E-8	Total Hazard Index Across All Media and Exposure Routes:					0.56

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
PCBs - Polychlorinated biphenyls
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.0020
Total immune HI=	0.50
Total liver HI=	0.0079
Total kidney HI=	0.0014
Total blood HI=	0.000082
Total body/organ weight HI=	0.0000072
Total other HI=	0.041

Table 9.5.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Receptor Population: Construction Worker - Undeveloped Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Subsurface Soil	Subsurface Soil	Undeveloped Area Subsurface Soil (1-20 ft depth)	Aluminum	--	NA	--	--	Aluminum	ND	0.0016	NA	--	0.0016
			Antimony	--	NA	--	--	Antimony	Longevity; metabolic	0.0043	NA	--	0.0043
			Arsenic	1E-7	NA	4E-8	2E-7	Arsenic	Skin/vascular	0.0086	NA	0.0034	0.012
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.0020	NA	--	0.0020
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00014	NA	0.000038	0.00018
			Chromium	--	NA	--	--	Chromium	ND	0.012	NA	--	0.012
			Copper	--	NA	--	--	Copper	ND	0.0028	NA	--	0.0028
			Iron	--	NA	--	--	Iron	ND	0.029	NA	--	0.029
			Manganese	--	NA	--	--	Manganese	CNS	0.0020	NA	--	0.0020
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.29	NA	--	0.29
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.0000087	NA	--	0.0000087
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.00048	NA	--	0.00048
			Selenium					Selenium	Selenosis: liver, CNS, skin	0.00011	NA	--	0.00011
			Silver	--	NA	--	--	Silver	Skin (argyria)	0.00068	NA	--	0.00068
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.0038	NA	--	0.0038
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0017	NA	--	0.0017
			Zinc	--	NA	--	--	Zinc	Blood	0.0016	NA	--	0.0016
			Carbazole	6E-11	NA	9E-11	1E-10	Carbazole	ND	--	NA	--	--
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.0000066	NA	--	0.0000066
			Xylene	--	NA			Xylene	Hyperactivity, body weight, mortality	0.0000066	NA	--	0.0000066
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.0000026	NA	0.0000045	0.0000072
			Benz[a]anthracene	6E-9	NA	1E-8	2E-8	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	5E-8	NA	8E-8	1E-7	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	6E-9	NA	1E-8	2E-8	Benzo[b]fluoranthene	ND	--	NA	--	--
			Benzo[k]fluoranthene	2E-10	NA	3E-10	5E-10	Benzo[k]fluoranthene	ND	--	NA	--	--
			Benzo[ghi]perylene	--	NA	--	--	Benzo[ghi]perylene	Body weight	0.0000048	NA	0.0000083	0.000013
			Dibenz[a,h]anthracene	6E-9	NA	1E-8	2E-8	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	2E-9	NA	4E-9	6E-9	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.0000050	NA	0.0000085	0.000013
			PCBs	3E-8	NA	5E-8	8E-8	PCBs	Immunologic	0.026	NA	0.048	0.074
			(Total)	2E-7		2E-7	4E-7	(Total)		0.39		0.051	0.44
			Total Risk Across All Media and Exposure Routes:				4E-7		Total Hazard Index Across All Media and Exposure Routes:				0.44

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
PCBs - Polychlorinated biphenyls
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.0021
Total immune HI=	0.36
Total liver HI=	0.0038
Total body/organ weight HI=	0.00050
Total metobolic HI =	0.0043
Total cardiovascular HI =	0.012
Total kidney HI =	0.0021
Total selenosis HI =	0.00011
Total skin HI =	0.00088
Total blood HI =	0.0035
Total other HI=	0.046

Table 9.6.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor - Undeveloped Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Surface Soil	Surface Soil	Undeveloped Area Surface Soil	Aluminum	--	NA	--	--	Aluminum	ND	0.0032	NA	--	0.0032
			Antimony	--	NA	--	--	Antimony	Longevity; metabolic	0.016	NA	--	0.016
			Arsenic	3E-6	NA	4E-7	4E-6	Arsenic	Skin/vascular	0.017	NA	0.0020	0.019
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.011	NA	--	0.011
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00077	NA	0.000061	0.00083
			Chromium	--	NA	--	--	Chromium	ND	0.067	NA	--	0.067
			Copper	--	NA	--	--	Copper	ND	0.0076	NA	--	0.0076
			Iron	--	NA	--	--	Iron	ND	0.060	NA	--	0.060
			Manganese	--	NA	--	--	Manganese	CNS	0.0075	NA	--	0.0075
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.87	NA	--	0.87
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.0017	NA	--	0.0017
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.0013	NA	--	0.0013
			Silver	--	NA	--	--	Silver	Skin (argyria)	0.0023	NA	--	0.0023
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.027	NA	--	0.027
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0042	NA	--	0.0042
			Zinc	--	NA	--	--	Zinc	Blood	0.032	NA	--	0.032
			Bis[2-ethylhexyl]phthalate	2E-7	NA	6E-8	2E-7	Bis[2-ethylhexyl]phthalate	Increased liver weight	0.0013	NA	0.00050	0.0018
			Benz[a]anthracene	4E-7	NA	2E-7	6E-7	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	5E-6	NA	2E-6	7E-6	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	5E-7	NA	3E-7	8E-7	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	1E-6	NA	8E-7	2E-6	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	3E-7	NA	1E-7	4E-7	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			Napthalene	--				Napthalene	Body weight	0.00013		0.000068	0.00020
			2-Methlynapthalene	--	NA	--	--	2-Methlynapthalene	Body weight	0.000064	NA	0.000033	0.00010
			PCBs	2E-6	NA	1E-6	3E-6	PCBs	Immunologic	0.11	NA	0.063	0.18
			(Total)	1E-5		5E-6	2E-5	(Total)		1.2		0.066	1.3
Sediment	Sediment	Undeveloped Area Surface Sediment	Aluminum	--	NA	--	--	Aluminum	ND	0.0072	NA	--	0.0072
			Arsenic	3E-6	NA	3E-7	3E-6	Arsenic	Skin/vascular	0.015	NA	0.0018	0.017
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00047	NA	0.000038	0.00051
			Chromium	--	NA	--	--	Chromium	ND	0.027	NA	--	0.027
			Iron	--	NA	--	--	Iron	ND	0.037	NA	--	0.037
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	2.2	NA	--	2.2
			Methylmercury	--		--	--	Methylmercury	Neurologic	0.00065	NA	--	0.00065
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.031	NA	--	0.031
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0040	NA	--	0.0040
			Zinc	--	NA	--	--	Zinc	Blood	0.0061	NA	--	0.0061
			Benz[a]anthracene	3E-7	NA	1E-7	4E-7	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	3E-6	NA	1E-6	4E-6	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	3E-7	NA	2E-7	4E-7	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	5E-7	NA	3E-7	8E-7	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	2E-7	NA	1E-7	3E-7	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			PCBs	3E-7	NA	2E-7	5E-7	PCBs	Immunologic	0.019	NA	0.011	0.029
			(Total)	7E-6		3E-6	1E-5	(Total)		2.4		0.012	2.4
Surface Water	Surface Water	Undeveloped Area Surface Water	Iron	--	NA	--	--	Iron	ND	0.00054	NA	0.00026	0.00080
			Manganese	--	NA	--	--	Manganese	CNS	0.00055	NA	0.0065	0.0071
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.0036	NA	0.025	0.028
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.0000017	NA	0.00000082	0.0000025
			(Total)	0E+0		0E+0	0E+0	(Total)		0.0047		0.031	0.036
			Total Risk Across All Media and Exposure Routes:				3E-5		Total Hazard Index Across All Media and Exposure Routes:				3.7

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
PCBs - Polychlorinated biphenyls
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.017
Total immune HI=	3.3
Total kidney HI=	0.013
Total liver HI=	0.056
Total skin HI=	0.0023
Total cardiovascular HI=	0.035
Total metabolic HI=	0.016
Total blood HI=	0.046
Total body/organ weight HI=	0.0034
Total other HI=	0.21

Table 9.7.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor - Undeveloped Area
Receptor Age: Adolescent/Pre-Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Surface Soil	Surface Soil	Undeveloped Area Surface Soil	Aluminum	--	NA	--	--	Aluminum	ND	0.0045	NA	--	0.0045
			Antimony	--	NA	--	--	Antimony	Longevity; metabolic	0.023	NA	--	0.023
			Arsenic	1E-6	NA	3E-7	2E-6	Arsenic	Skin/vascular	0.024	NA	0.0057	0.029
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.016	NA	--	0.016
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.0011	NA	0.00018	0.0013
			Chromium	--	NA	--	--	Chromium	ND	0.096	NA	--	0.096
			Copper	--	NA	--	--	Copper	ND	0.011	NA	--	0.011
			Iron	--	NA	--	--	Iron	ND	0.085	NA	--	0.085
			Manganese	--	NA	--	--	Manganese	CNS	0.011	NA	--	0.011
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	1.2	NA	--	1.2
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.0024	NA	--	0.0024
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.0019	NA	--	0.0019
			Silver	--	NA	--	--	Silver	Skin (argyria)	0.0033	NA	--	0.0033
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.039	NA	--	0.039
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0060	NA	--	0.0060
			Zinc	--	NA	--	--	Zinc	Blood	0.045	NA	--	0.045
			Bis[2-ethylhexyl]phthalate	6E-8	NA	5E-8	1E-7	Bis[2-ethylhexyl]phthalate	Increased liver weight	0.0018	NA	0.0014	0.0032
			Benz[a]anthracene	2E-7	NA	2E-7	3E-7	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	2E-6	NA	2E-6	4E-6	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	2E-7	NA	2E-7	4E-7	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	6E-7	NA	6E-7	1E-6	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	1E-7	NA	1E-7	2E-7	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			Napthalene	--	NA	--	--	Napthalene	Body weight	0.00019	NA	0.00020	0.00038
			2-Methlynapthalene	--	NA	--	--	2-Methlynapthalene	Body weight	0.000091	NA	0.000095	0.00019
			PCBs	8E-7	NA	9E-7	2E-6	PCBs	Immunologic	0.16	NA	0.18	0.34
			(Total)	5E-6		5E-6	1E-5	(Total)		1.8		0.19	2.0
Sediment	Sediment	Undeveloped Area Surface Sediment	Aluminum	--	NA	--	--	Aluminum	ND	0.010	NA	--	0.010
			Arsenic	1E-6	NA	3E-7	2E-6	Arsenic	Skin/vascular	0.022	NA	0.0052	0.027
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00067	NA	0.00011	0.00078
			Chromium	--	NA	--	--	Chromium	ND	0.038	NA	--	0.038
			Iron	--	NA	--	--	Iron	ND	0.053	NA	--	0.053
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	3.2	NA	--	3.2
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00093	NA	--	0.00093
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.044	NA	--	0.044
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0057	NA	--	0.0057
			Zinc	--	NA	--	--	Zinc	Blood	0.0087	NA	--	0.0087
			Benz[a]anthracene	1E-7	NA	1E-7	2E-7	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	1E-6	NA	1E-6	2E-6	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	1E-7	NA	1E-7	3E-7	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	2E-7	NA	2E-7	5E-7	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	8E-8	NA	9E-8	2E-7	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			PCBs	1E-7	NA	2E-7	3E-7	PCBs	Immunologic	0.027	NA	0.030	0.057
			(Total)	3E-6		2E-6	5E-6	(Total)		3.4		0.035	3.4
Surface Water	Surface Water	Undeveloped Area Surface Water	Iron	--	NA	--	--	Iron	ND	0.00077	NA	0.00026	0.0010
			Manganese	--	NA	--	--	Manganese	CNS	0.00078	NA	0.0065	0.0073
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.0052	NA	0.025	0.030
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.0000025	NA	0.00000082	0.0000033
			(Total)	0E+0		0E+0	0E+0	(Total)		0.0068		0.032	0.038
			Total Risk Across All Media and Exposure Routes:				2E-5		Total Hazard Index Across All Media and Exposure Routes:				5.4

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
PCBs - Polychlorinated biphenyls
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS HI=	0.021
Total immune HI=	4.9
Total kidney HI=	0.018
Total liver HI=	0.083
Total skin HI=	0.0033
Total cardiovascular HI=	0.056
Total metabolic HI=	0.023
Total blood HI=	0.066
Total body/organ weight HI=	0.0051
Total other HI=	0.30

Table 9.8.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Future Hypothetical
Receptor Population: Resident - domestic use of groundwater
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Groundwater	Air	Indoor Air (showering/ bathing)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.20	NA	0.20
			Benzene	NA	5E-5	NA	5E-5	Benzene	Hematopoietic	NA	0.45	NA	0.45
			Bis[2-ethylhexyl]phthalate	NA	7E-6	NA	7E-6	Bis[2-ethylhexyl]phthalate	Increased liver weight	NA	0.055	NA	0.055
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.076	NA	0.076
			Chloroethane	NA	2E-6	NA	2E-6	Chloroethane	ND	NA	0.00055	NA	0.00055
			1,4-Dichlorobenzene	NA	8E-6	NA	8E-6	1,4-Dichlorobenzene	Increased liver weight	NA	0.0036	NA	0.0036
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.12	NA	0.12
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.084	NA	0.084
			4-Methylphenol	NA	--	NA	--	4-Methylphenol	ND	NA	0.53	NA	0.53
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.069	NA	0.069
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.41	NA	0.41
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	4.0	NA	4.0
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.24	NA	0.24
			(Total)	NA	6E-5	NA	6E-5	(Total)		NA	6.3	NA	6.3
Groundwater	Groundwater	Groundwater Sitewide	Arsenic	1E-4	NA	3E-7	1E-4	Arsenic	Skin/vascular	0.71	NA	0.0016	0.71
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.16	NA	0.0051	0.16
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.0071	NA	0.00064	0.0078
			Copper	--	NA	--	--	Copper	ND	0.011	NA	0.0024	0.013
			Iron	--	NA	--	--	Iron	ND	1.4	NA	0.0032	1.4
			Manganese	--	NA	--	--	Manganese	CNS	1.1	NA	0.062	1.2
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.76	NA	0.024	0.78
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.0062	NA	0.000014	0.0062
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.031	NA	0.00017	0.031
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.99	NA	0.0022	1.0
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.075	NA	0.0065	0.082
			Acetone	--	NA	--	--	Acetone	Kidney	0.0016	NA	0.0000051	0.0016
			Benzene	7E-6	NA	3E-7	7E-6	Benzene	Hematopoietic	0.070	NA	0.0033	0.073
			Chlorobenzene	--	NA	--	--	Chlorobenzene	Liver	0.011	NA	0.0010	0.012
			Chloroethane	2E-7	NA	4E-6	2E-7	Chloroethane	ND	0.00043	NA	0.0000078	0.00044
			1,2-Dichloroethene, isomers	--	NA	--	--	1,2-Dichloroethene, isomers	Serum enzymes	0.011	NA	0.000033	0.011
			1,4-Dichlorobenzene	1E-6	NA	2E-7	1E-6	1,4-Dichlorobenzene	ND	0.0037	NA	0.00051	0.0042
			4-Methyl-2-pentanone	--	NA	--	--	4-Methyl-2-pentanone	ND	0.0025	NA	0.000000080	0.0025
			4-Methylphenol	--	NA	--	--	4-Methylphenol	ND	0.052	NA	0.00050	0.052
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.037	NA	0.0038	0.041
			Xylene	--	NA	--	--	Xylene	Hyperactivity, body wt, mortality	0.0051	NA	0.00093	0.0060
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.0014	NA	0.00021	0.0016
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.018	NA	0.0027	0.020
			(Total)	1E-4		8E-7	1E-4	(Total)		5.5		0.12	5.6
			Total Risk Across All Media and Exposure Routes:				2E-4		Total Risk Across All Media and Exposure Routes:				12

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS HI=	1.7
Total immune HI=	0.76
Total kidney HI=	0.38
Total liver HI=	1.0
Total body weight HI =	0.15
Total blood HI =	0.81
Total cardiovascular HI =	0.71
Total other HI =	8.0

Table 9.9.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Future Hypothetical
Receptor Population: Resident - domestic use of groundwater
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Groundwater	Air	Indoor Air (showering/ bathing)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.62	NA	0.62
			Benzene	NA	3E-5	NA	3E-5	Benzene	Hematopoietic	NA	1.4	NA	1.4
			Bis[2-ethylhexyl]phthalate	NA	4E-6	NA	4E-6	Bis[2-ethylhexyl]phthalate	Increased liver weight	NA	0.17	NA	0.17
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.23	NA	0.23
			Chloroethane	NA	1E-6	NA	1E-6	Chloroethane	ND	NA	0.0017	NA	0.0017
			1,4-Dichlorobenzene	NA	5E-6	NA	5E-6	1,4-Dichlorobenzene	Increased liver weight	NA	0.011	NA	0.011
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.37	NA	0.37
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.26	NA	0.26
			4-Methylphenol	NA	--	NA	--	4-Methylphenol	ND	NA	1.6	NA	1.6
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.21	NA	0.21
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	1.3	NA	1.3
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	12	NA	12
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.73	NA	0.73
			(Total)	NA	4E-5	NA	4E-5	(Total)		NA	19	NA	19
Groundwater	Groundwater	Groundwater Sitewide	Arsenic	1E-4	NA	2E-7	1E-4	Arsenic	Skin/vascular	2.5	NA	0.0049	2.5
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.56	NA	0.016	0.57
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.025	NA	0.0020	0.027
			Copper	--	NA	--	--	Copper	ND	0.038	NA	0.0075	0.045
			Iron	--	NA	--	--	Iron	ND	4.9	NA	0.010	4.9
			Manganese	--	NA	--	--	Manganese	CNS	3.8	NA	0.19	4.0
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	2.7	NA	0.075	2.7
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.022	NA	0.000043	0.022
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.11	NA	0.00053	0.11
			Thallium	--	NA	--	--	Thallium	Liver enzymes	3.5	NA	0.0069	3.5
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.26	NA	0.020	0.28
			Acetone	--	NA	--	--	Acetone	Kidney	0.0057	NA	0.000016	0.0057
			Benzene	5E-6	NA	2E-7	5E-6	Benzene	Hematopoietic	0.24	NA	0.010	0.25
			Chlorobenzene	--	NA	--	--	Chlorobenzene	Liver	0.039	NA	0.0032	0.042
			Chloroethane	2E-7	NA	2E-9	2E-7	Chloroethane	ND	0.0015	NA	0.000024	0.0015
			1,2-Dichloroethene, isomers	--	NA	--	--	1,2-Dichloroethene, isomers	Serum enzymes	0.040	NA	0.00010	0.040
			1,4-Dichlorobenzene	8E-7	NA	1E-7	9E-7	1,4-Dichlorobenzene	ND	0.013	NA	0.0016	0.014
			4-Methyl-2-pentanone	--	NA	--	--	4-Methyl-2-pentanone	ND	0.0086	NA	0.00000082	0.0086
			4-Methylphenol	--	NA	--	--	4-Methylphenol	ND	0.18	NA	0.0015	0.18
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.13	NA	0.012	0.14
			Xylene	--	NA	--	--	Xylene	Hyperactivity, body wt, mortality	0.018	NA	0.0029	0.021
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.0048	NA	0.00066	0.0054
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.062	NA	0.0084	0.070
			(Total)	1E-4		5E-7	1E-4	(Total)		19		0.37	19
			Total Risk Across All Media and Exposure Routes:				1E-4		Total Risk Across All Media and Exposure Routes:				39

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS HI=	5.5
Total immune HI=	2.7
Total kidney HI=	1.2
Total liver HI=	3.6
Total body weight HI =	0.51
Total blood HI =	1.9
Total cardiovascular HI =	2.5
Total other HI =	19

Table 9.1.Central Tendency
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Current
Receptor Population: Long-term Worker - Developed Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Air	Air	Outdoor Air	Mercury vapor	NA	--	NA	--	Mercury vapor	CNS	NA	0.010	NA	0.010
			(Total)	NA	0E+0	NA	0E+0	(Total)			0.010		0.010
Subsurface Soil	Air	Indoor Air (derived from subsurface soil)	Benzene	NA	3E-6	NA	3E-6	Benzene	Hematopoietic	NA	0.13	NA	0.13
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.12	NA	0.12
			(Total)	NA	3E-6	NA	3E-6	(Total)			0.25		0.25
Groundwater	Air	Indoor Air (derived from groundwater)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.000032	NA	0.000032
			Benzene	NA	2E-6	NA	2E-6	Benzene	Hematopoietic	NA	0.00099	NA	0.0010
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.00022	NA	0.00022
			Chloroethane	NA	7E-9	NA	7E-9	Chloroethane	ND	NA	0.0000093	NA	0.0000093
			1,4-Dichlorobenzene	NA	2E-9	NA	2E-9	1,4-Dichlorobenzene	Increased liver weight	NA	0.0000050	NA	0.0000050
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.00038	NA	0.00038
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.000024	NA	0.000024
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.0022	NA	0.0022
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.00097	NA	0.00097
			Naphthalene	NA		NA		Naphthalene	Nasal effects; hyperplasia	NA	0.0016	NA	0.0016
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.00011	NA	0.00011
			(Total)	NA	3E-6	NA	3E-6	(Total)		NA	0.0066	NA	0.0066
Surface Soil	Surface Soil	Developed Area Surface Soil (unpaved)	Aluminum	--	NA	--	--	Aluminum	ND	0.0059	NA	--	0.0059
			Arsenic	8E-7	NA	3E-8	8E-7	Arsenic	Skin/vascular	0.018	NA	0.00071	0.019
			Chromium	--	NA	--	--	Chromium	ND	0.016	NA	--	0.016
			Copper	--	NA	--	--	Copper	ND	0.0057	NA	--	0.0057
			Iron	--	NA	--	--	Iron	ND	0.038	NA	--	0.038
			Manganese	--	NA	--	--	Manganese	CNS	0.0057	NA	--	0.0057
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.51	NA	--	0.51
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0076	NA	--	0.0076
			Benzo[a]pyrene	1E-7	NA	2E-8	2E-7	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	3E-8	NA	4E-9	3E-8	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	2E-8	NA	4E-9	3E-8	Dibenz[a,h]anthracene	ND	--	NA	--	--
			(Total)	9E-7		6E-8	1E-6	(Total)		0.60		0.00071	0.60
			Total Risk Across All Media and Exposure Routes:				4E-6		Total Hazard Index Across All Media and Exposure Routes:				0.87

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.019
Total immune HI=	0.51
Total liver HI=	0.0000050
Total cardiovascular HI=	0.019
Total blood HI=	0.14
Total body/organ weight HI=	0.0000050
Total other HI=	0.19

Table 9.2.Central Tendency
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Receptor Population: Long-term Worker - Developed Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Air	Air	Outdoor Air	Mercury vapor	NA	--	NA	--	Mercury vapor	CNS	NA	0.010	NA	0.010
			(Total)	NA	0E+0	NA	0E+0	(Total)			0.010		0.010
Subsurface Soil	Air	Indoor Air (derived from subsurface soil)	Benzene	NA	3E-6	NA	3E-6	Benzene	Hematopoietic	NA	0.13	NA	0.13
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.12	NA	0.12
			(Total)	NA	3E-6	NA	3E-6	(Total)			0.25		0.25
Groundwater	Air	Indoor Air (derived from groundwater)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.000032	NA	0.000032
			Benzene	NA	2E-6	NA	2E-6	Benzene	Hematopoietic	NA	0.00099	NA	0.0010
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.00022	NA	0.00022
			Chloroethane	NA	7E-9	NA	7E-9	Chloroethane	ND	NA	0.0000093	NA	0.0000093
			1,4-Dichlorobenzene	NA	2E-9	NA	2E-9	1,4-Dichlorobenzene	Increased liver weight	NA	0.0000050	NA	0.0000050
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.00038	NA	0.00038
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.000024	NA	0.000024
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.0022	NA	0.0022
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.00097	NA	0.00097
			Naphthalene	NA		NA		Naphthalene	Nasal effects; hyperplasia	NA	0.0016	NA	0.0016
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.00011	NA	0.00011
			(Total)	NA	3E-6	NA	3E-6	(Total)		NA	0.0066	NA	0.0066
Surface Soil	Surface Soil	Developed Area Surface Soil (all)	Aluminum	--	NA	--	--	Aluminum	ND	0.0059	NA	--	0.0059
			Arsenic	8E-7	NA	3E-8	8E-7	Arsenic	Skin/vascular	0.018	NA	0.00071	0.019
			Chromium	--	NA	--	--	Chromium	ND	0.012	NA	--	0.012
			Copper	--	NA	--	--	Copper	ND	0.0084	NA	--	0.0084
			Iron	--	NA	--	--	Iron	ND	0.035	NA	--	0.035
			Manganese	--	NA	--	--	Manganese	CNS	0.0042	NA	--	0.0042
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	3.7	NA	--	3.7
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.015	NA	--	0.015
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0076	NA	--	0.0076
			Benzene	7.E-10	NA	--	7E-10	Benzene	Hematopoietic	0.000035	NA		0.000035
			Benz[a]anthracene	3.E-8	NA	5E-9	3E-8	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	2.E-7	NA	4E-8	3E-7	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	4.E-8	NA	6E-9	4E-8	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	5.E-8	NA	9E-9	6E-8	Dibenz[a,h]anthracene	ND	--	NA	--	--
			(Total)	1E-6		9E-8	1E-6	(Total)		3.8		0.00071	3.8

Table 9.2.Central Tendency (continued)
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Receptor Population: Long-term Worker - Developed Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Groundwater	Groundwater	Groundwater Sitewide	Arsenic	4E-6	NA	3E-10	4E-6	Arsenic	Skin/vascular	0.065	NA	0.000010	0.065
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.015	NA	0.000031	0.015
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00065	NA	0.0000039	0.00066
			Copper	--	NA	--	--	Copper	ND	0.0010	NA	0.000015	0.0010
			Iron	--	NA	--	--	Iron	ND	0.13	NA	0.000019	0.13
			Manganese	--	NA	--	--	Manganese	CNS	0.10	NA	0.00038	0.10
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.069	NA	0.00015	0.070
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00057	NA	0.000000085	0.00057
			Nickel	--	NA	--	--	Nickel	Decreased body/organ weights	0.0028	NA	0.0000011	0.0028
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.091	NA	0.000014	0.091
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0069	NA	0.000040	0.0069
			Acetone	--	NA	--	--	Acetone	Kidney	0.00015	NA	0.000000031	0.00015
			Benzene	2E-7	NA	3E-10	2E-7	Benzene	Hematopoietic	0.0064	NA	0.000020	0.0064
			Chlorobenzene	--	NA	--	--	Chlorobenzene	Liver	0.0010	NA	0.0000063	0.0010
			Chloroethane	--	NA	--	--	Chloroethane	ND	0.000040	NA	0.000000048	0.000040
			1,2-Dichloroethene, isomers	6E-9	NA	4E-12	6E-9	1,2-Dichloroethene, isomers	Serum enzymes	0.0010	NA	0.00000020	0.0010
			1,4-Dichlorobenzene	--	NA	--	--	1,4-Dichlorobenzene	ND	0.00033	NA	0.0000031	0.00034
			4-Methyl-2-pentanone	3E-8	NA	1E-10	3E-8	4-Methyl-2-pentanone	ND	0.00023	NA	0.0000000012	0.00023
			4-Methylphenol	--	NA	--	--	4-Methylphenol	ND	0.0047	NA	0.0000031	0.0047
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.0034	NA	0.000023	0.0034
			Xylene	--	NA	--	--	Xylene	Hyperactivity, body wt, mortality	0.00047	NA	0.0000057	0.00047
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.00013	NA	0.0000013	0.00013
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.0016	NA	0.000017	0.0016
			(Total)	4E-6		7E-10	4E-6	(Total)		0.50		0.00074	0.50
			Total Risk Across All Media and Exposure Routes:				8E-6		Total Hazard Index Across All Media and Exposure Routes:				4.5

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.12
Total immune HI=	3.7
Total kidney HI=	0.019
Total liver HI=	0.11
Total cardiovascular HI=	0.084
Total blood HI=	0.15
Total body/organ weight HI=	0.0080
Total other HI=	0.33

Table 9.3.Central Tendency
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Receptor Population: Long-term Worker - Undeveloped Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Air	Air	Outdoor Air	Mercury vapor	NA	--	NA	--	Mercury vapor	CNS	NA	0.010	NA	0.010
			(Total)		0E+0		0E+0	(Total)			0.010		0.010
Subsurface Soil	Air	Indoor Air (derived from subsurface soil)	Carbazole	NA	1E-11	NA	1E-11	Carbazole	ND	NA	--	NA	--
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.020	NA	0.020
			Xylenes	NA	--	NA		Xylenes	CNS	NA	0.12	NA	0.12
			Benz[a]anthracene	NA	9E-9	NA	9E-9	Benz[a]anthracene	ND	NA	--	NA	--
			Benzo[a]pyrene	NA	7E-8	NA	7E-8	Benzo[a]pyrene	ND	NA	--	NA	--
			Benzo[b]fluoranthene	NA	9E-9	NA	9E-9	Benzo[b]fluoranthene	ND	NA	--	NA	--
			Benzo[ghi]perylene	NA	--	NA	--	Benzo[ghi]perylene	Nasal effects; hyperplasia	NA	0.000053	NA	0.000053
			Benzo[k]fluoranthene	NA	3E-10	NA	3E-10	Benzo[k]fluoranthene	ND	NA	--	NA	--
			Dibenz[a,h]anthracene	NA	1E-8	NA	1E-8	Dibenz[a,h]anthracene	ND	NA	--	NA	--
			Indeno[1,2,3-cd]pyrene	NA	3E-9	NA	3E-9	Indeno[1,2,3-cd]pyrene	ND	NA	--	NA	--
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.12	NA	0.12
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	0.31	NA	0.31
			(Total)	NA	1E-7	NA	1E-7	(Total)		NA	0.57	NA	0.57
Groundwater	Air	Indoor Air (derived from groundwater)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.000032	NA	0.000032
			Benzene	NA	2E-8	NA	2E-8	Benzene	Hematopoietic	NA	0.00099	NA	0.0010
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.00022	NA	0.00022
			Chloroethane	NA	7E-9	NA	7E-9	Chloroethane	ND	NA	0.0000093	NA	0.0000093
			1,4-Dichlorobenzene	NA	2E-9	NA	2E-9	1,4-Dichlorobenzene	Increased liver weight	NA	0.0000050	NA	0.0000050
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.00038	NA	0.00038
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.000024	NA	0.000024
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.0022	NA	0.0022
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.00097	NA	0.00097
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	0.0016	NA	0.0016
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.00011	NA	0.00011
			(Total)	NA	3E-8	NA	3E-8	(Total)		NA	0.0066	NA	0.0066
Surface Soil	Surface Soil	Undeveloped Area Surface Soil	Aluminum	--	NA	--	--	Aluminum	ND	0.0030	NA	--	0.0030
			Antimony	--	NA	--	--	Antimony	Longevity; metabolic	0.016	NA	--	0.016
			Arsenic	7E-7	NA	3E-8	7E-7	Arsenic	Skin/vascular	0.016	NA	0.00062	0.016
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.011	NA	--	0.011
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00073	NA	0.000019	0.00075
			Chromium	--	NA	--	--	Chromium	ND	0.064	NA	--	0.064
			Copper	--	NA	--	--	Copper	ND	0.0072	NA	--	0.0072
			Iron	--	NA	--	--	Iron	ND	0.056	NA	--	0.056
			Manganese	--	NA	--	--	Manganese	CNS	0.0071	NA	--	0.0071
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.83	NA	--	0.83
			Methylmercury	--	NA	--		Methylmercury	Neurologic	0.0016	NA	--	0.0016
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.0013	NA	--	0.0013
			Silver	--	NA	--	--	Silver	Skin (argyria)	0.0022	NA	--	0.0022
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.026	NA	--	0.026
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0040	NA	--	0.0040
			Zinc	--	NA	--	--	Zinc	Blood	0.030	NA	--	0.030
			Bis[2-ethylhexyl]phthalate	3E-8	NA	4E-9	4E-8	Bis[2-ethylhexyl]phthalate	Increased liver weight	0.0012	NA	0.00016	0.0013
			Benz[a]anthracene	8E-8	NA	0E+0	8E-8	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	1E-6	NA	1E-8	1E-6	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	1E-7	NA	2E-7	3E-7	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	3E-7	NA	2E-8	3E-7	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	6E-8	NA	5E-8	1E-7	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			Naphthalene	--	NA	1E-8	1E-8	Naphthalene	Body weight	0.00012	NA	0.000021	0.00015
			2-Methylnaphthalene	--		--	--	2-Methylnaphthalene	Body weight	0.000060	NA	0.000010	0.000071
			PCBs	4E-7	NA	6E-8	5E-7	PCBs	Immunologic	0.11	NA	0.020	0.13
			(Total)	9E-6		4E-7	9E-6	(Total)		1.2		0.021	1.2

Table 9.3.Central Tendency (continued)
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Receptor Population: Long-term Worker - Undeveloped Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Groundwater	Groundwater	Groundwater Sitewide	Arsenic	4E-6	NA	3E-10	4E-6	Arsenic	Skin/vascular	0.065	NA	0.000010	0.065
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.015	NA	0.000031	0.015
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00065	NA	0.0000039	0.00066
			Copper	--	NA	--	--	Copper	ND	0.0010	NA	0.000015	0.0010
			Iron	--	NA	--	--	Iron	ND	0.13	NA	0.000019	0.13
			Manganese	--	NA	--	--	Manganese	CNS	0.10	NA	0.00038	0.10
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.069	NA	0.00015	0.070
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00057	NA	0.000000085	0.00057
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.0028	NA	0.0000011	0.0028
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.091	NA	0.000014	0.091
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0069	NA	0.000040	0.0069
			Acetone	--	NA	--	--	Acetone	Kidney	0.00015	NA	0.000000031	0.00015
			Benzene	2E-7	NA	3E-10	2E-7	Benzene	Hematopoietic	0.0064	NA	0.000020	0.0064
			Chlorobenzene	--	NA	--	--	Chlorobenzene	Liver	0.0010	NA	0.0000063	0.0010
			Chloroethane	--	NA	--	--	Chloroethane	ND	0.000040	NA	0.000000048	0.000040
			1,2-Dichloroethene, isomers	6E-9	NA	4E-12	6E-9	1,2-Dichloroethene, isomers	Serum enzymes	0.0010	NA	0.00000020	0.0010
			1,4-Dichlorobenzene	--	NA	--	--	1,4-Dichlorobenzene	ND	0.00033	NA	0.0000031	0.00034
			4-Methyl-2-pentanone	3E-8	NA	1E-10	3E-8	4-Methyl-2-pentanone	ND	0.00023	NA	0.0000000012	0.00023
			4-Methylphenol	--	NA	--	--	4-Methylphenol	ND	0.0047	NA	0.0000031	0.0047
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.0034	NA	0.000023	0.0034
			Xylene	--	NA	--	--	Xylene	Hyperactivity, body wt, mortality	0.00047	NA	0.0000057	0.00047
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.00013	NA	0.0000013	0.00013
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.0016	NA	0.000017	0.0016
			(Total)	4E-6		7E-10	4E-6	(Total)		0.50		0.00074	0.50
			Total Risk Across All Media and Exposure Routes:				7E-6		Total Hazard Index Across All Media and Exposure Routes:				2.3

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
PCBs - Polychlorinated biphenyls
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.27
Total immune HI=	1.0
Total kidney HI=	0.027
Total liver HI=	0.12
Total cardiovascular HI=	0.082
Total skin HI=	0.0022
Total metabolic HI =	0.016
Total blood HI=	0.048
Total bodyforgan weight HI=	0.011
Total other HI=	0.69

Table 9.4.Central Tendency
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Current/ Future
Receptor Population: Construction Worker - Developed Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal *	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal *	Exposure Routes Total
Subsurface Soil	Subsurface Soil	Developed Area Subsurface Soil (1-20 ft depth)	Arsenic	1E-7	NA	4E-9	1E-7	Arsenic	Skin/vascular	0.000065	NA	0.00032	0.00038
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.000023	NA	--	0.000023
			Chromium	--	NA	--	--	Chromium	ND	0.000085	NA	--	0.000085
			Copper	--	NA	--	--	Copper	ND	0.00036	NA	--	0.00036
			Iron	--	NA	--	--	Iron	ND	0.00023	NA	--	0.00023
			Manganese	--	NA	--	--	Manganese	CNS	0.000034	NA	--	0.000034
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.0083	NA	--	0.0083
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.00013	NA	--	0.00013
			Benzene	1E-9	NA	--	1E-9	Benzene	Hematopoietic	0.0000014	NA	--	0.0000014
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.000000044	NA	0.00000094	0.0000010
			PCBs	7E-9	NA	9E-10	8E-9	PCBs	Immunologic	0.000035	NA	0.00081	0.00085
			(Total)	1E-7		5E-9	2E-7	(Total)		0.0092		0.0011	0.010
			Total Risk Across All Media and Exposure Routes:				2E-7		Total Hazard Index Across All Media and Exposure Routes:				0.010

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
PCBs - Polychlorinated biphenyls
* Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.000034
Total immune HI=	0.0091
Total liver HI=	0.00013
Total kidney HI=	0.000023
Total blood HI=	0.0000014
Total body/organ weight HI=	0.0000010
Total other HI=	0.00068

Table 9.5.Central Tendency
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Receptor Population: Construction Worker - Undeveloped Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Subsurface Soil	Subsurface Soil	Undeveloped Area Subsurface Soil (1-20 ft depth)	Aluminum	--	NA	--	--	Aluminum	ND	0.000027	NA	--	0.000027
			Antimony	--	NA	--	--	Antimony	Longevity, metabolic	0.000071	NA	--	0.000071
			Arsenic	3E-7	NA	9E-9	3E-7	Arsenic	Skin/vascular	0.00014	NA	0.00071	0.00085
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.000033	NA	--	0.000033
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.0000024	NA	0.0000078	0.000010
			Chromium	--	NA	--	--	Chromium	ND	0.00020	NA	--	0.00020
			Copper	--	NA	--	--	Copper	ND	0.000047	NA	--	0.000047
			Iron	--	NA	--	--	Iron	ND	0.00049	NA	--	0.00049
			Manganese	--	NA	--	--	Manganese	CNS	0.000034	NA	--	0.000034
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.0048	NA	--	0.0048
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00000015	NA	--	0.00000015
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.0000080	NA	--	0.0000080
			Selenium	--				Selenium	Selenosis: liver, CNS, skin	0.0000018	NA	--	0.0000018
			Silver	--	NA	--	--	Silver	Skin (argyria)	0.000015	NA	--	0.000015
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.000064	NA	--	0.000064
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.000028	NA	--	0.000028
			Zinc	--	NA	--	--	Zinc	Blood	0.000031	NA	--	0.000031
			Carbazole	2E-10	NA	2E-11	2E-10	Carbazole	ND	--	NA	--	--
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.000000071	NA	--	0.000000071
			Xylene	--	NA			Xylene	Hyperactivity, body weight, mortality	0.00000011	NA	--	0.00000011
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.000000044	NA	0.00000094	0.0000010
			Benz[a]anthracene	2E-8	NA	2E-9	2E-8	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	1E-7	NA	2E-8	1E-7	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	2E-8	NA	2E-9	2E-8	Benzo[b]fluoranthene	ND	--	NA	--	--
			Benzo[ghi]perylene	--	NA	--	--	Benzo[ghi]perylene	Body weight	0.000000081	NA	0.0000017	0.0000018
			Benzo[k]fluoranthene	5E-10	NA	6E-11	6E-10	Benzo[k]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	2E-8	NA	6E-11	2E-8	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	6E-9	NA	2E-9	8E-9	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			Naphthalene	--	NA	--	0E+0	Naphthalene	Body weight	0.000000083	NA	0.0000018	--
			PCBs	8E-8	NA	1E-8	9E-8	PCBs	Immunologic	0.00043	NA	0.0099	0.010
			(Total)	6E-7		4E-8	6E-7	(Total)		0.0064		0.011	0.017
			Total Risk Across All Media and Exposure Routes:				6E-7					Total Hazard Index Across All Media and Exposure Routes:	0.017

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
PCBs - Polychlorinated biphenyls
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.000334
Total immune HI=	0.015
Total liver HI=	0.000064
Total body/organ weight HI=	0.0000081
Total metabolic HI =	0.000071
Total cardiovascular HI =	0.00085
Total kidney HI =	0.000043
Total selenosis HI =	0.0000018
Total skin HI =	0.000015
Total blood HI =	0.000058
Total other HI=	0.00077

Table 9.6.Central Tendency
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor - Undeveloped Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal *	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal *	Exposure Routes Total
Surface Soil	Surface Soil	Undeveloped Area Surface Soil	Aluminum	--	NA	--	--	Aluminum	ND	0.00078	NA	--	0.00078
			Antimony	--	NA	--	--	Antimony	Longevity; metabolic	0.0040	NA	--	0.0040
			Arsenic	2E-7	NA	8E-9	2E-7	Arsenic	Skin/vascular	0.0041	NA	0.00014	0.0042
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.0026	NA	--	0.0026
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00019	NA	0.0000043	0.00019
			Chromium	--	NA	--	--	Chromium	ND	0.017	NA	--	0.017
			Copper	--	NA	--	--	Copper	ND	0.0019	NA	--	0.0019
			Iron	--	NA	--	--	Iron	ND	0.015	NA	--	0.015
			Manganese	--	NA	--	--	Manganese	CNS	0.0019	NA	--	0.0019
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.22	NA	--	0.22
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00041	NA	--	0.00041
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.00033	NA	--	0.00033
			Silver	--	NA	--	--	Silver	Skin (argyria)	0.00056	NA	--	0.00056
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.0067	NA	--	0.0067
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0010	NA	--	0.0010
			Zinc	--	NA	--	--	Zinc	Blood	0.0078	NA	--	0.0078
			Bis[2-ethylhexyl]phthalate	1E-8	NA	1E-9	1E-8	Bis[2-ethylhexyl]phthalate	Increased liver weight	0.00031	NA	0.000035	0.00034
			Benz[a]anthracene	3E-8	NA	4E-9	3E-8	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	3E-7	NA	5E-8	4E-7	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	4E-8	NA	6E-9	4E-8	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	1E-7	NA	2E-8	1E-7	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	2E-8	NA	3E-9	2E-8	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			Napthalene	--		--		Napthalene	Body weight	0.000032		0.0000048	0.000037
			2-Methlynapthalene	--	NA	--	--	2-Methlynapthalene	Body weight	0.000016	NA	0.0000023	0.000018
			PCBs	1E-7	NA	2E-8	2E-7	PCBs	Immunologic	0.028	NA	0.0045	0.032
			(Total)	9E-7		1E-7	1E-6	(Total)		0.31		0.0047	0.31
Sediment	Sediment	Undeveloped Area Surface Sediment	Aluminum	--	NA	--	--	Aluminum	ND	0.0018	NA	--	0.0018
			Arsenic	2E-7	NA	7E-9	2E-7	Arsenic	Skin/vascular	0.0037	NA	0.00013	0.0039
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00012	NA	0.0000026	0.00012
			Chromium	--	NA	--	--	Chromium	ND	0.0066	NA	--	0.0066
			Iron	--	NA	--	--	Iron	ND	0.0091	NA	--	0.0091
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.55	NA	--	0.55
			Methylmercury	--		--	--	Methylmercury	Neurologic	0.00016	NA	--	0.00016
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.0076	NA	--	0.0076
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0010	NA	--	0.0010
			Zinc	--	NA	--	--	Zinc	Blood	0.0015	NA	--	0.0015
			Benz[a]anthracene	2E-8	NA	3E-9	2E-8	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	2E-7	NA	3E-8	2E-7	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	2E-8	NA	3E-9	2E-8	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	4E-8	NA	6E-9	4E-8	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	1E-8	NA	2E-9	2E-8	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			PCBs	2E-8	NA	4E-9	3E-8	PCBs	Immunologic	0.0046	NA	0.00074	0.0054
			(Total)	5E-7		5E-8	6E-7	(Total)		0.58		0.00087	0.58
Surface Water	Surface Water	Undeveloped Area Surface Water	Iron	--	NA	--	--	Iron	ND	0.00013	NA	0.000063	0.00020
			Manganese	--	NA	--	--	Manganese	CNS	0.00014	NA	0.0016	0.0017
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.00090	NA	0.0061	0.0070
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00000042	NA	0.00000020	0.00000062
			(Total)	0E+0		0E+0	0E+0	(Total)		0.0012		0.0077	0.0089
			Total Risk Across All Media and Exposure Routes:				2E-6		Total Hazard Index Across All Media and Exposure Routes:				0.90

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
PCBs - Polychlorinated biphenyls
* Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.0042
Total immune HI=	0.81
Total kidney HI=	0.0031
Total liver HI=	0.014
Total skin HI=	0.00056
Total cardiovascular HI=	0.0081
Total metabolic HI=	0.0040
Total blood HI=	0.011
Total body/organ weight HI=	0.00072
Total other HI=	0.052

Table 9.7.Central Tendency
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor - Undeveloped Area
Receptor Age: Adolescent/Pre-Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Surface Soil	Surface Soil	Undeveloped Area Surface Soil	Aluminum	--	NA	--	--	Aluminum	ND	0.0011	NA	--	0.0011
			Antimony	--	NA	--	--	Antimony	Longevity; metabolic	0.0058	NA	--	0.0058
			Arsenic	3E-7	NA	3E-8	4E-7	Arsenic	Skin/vascular	0.0058	NA	0.00056	0.0064
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.0040	NA	--	0.0040
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00027	NA	0.000017	0.00029
			Chromium	--	NA	--	--	Chromium	ND	0.024	NA	--	0.024
			Copper	--	NA	--	--	Copper	ND	0.0027	NA	--	0.0027
			Iron	--	NA	--	--	Iron	ND	0.021	NA	--	0.021
			Manganese	--	NA	--	--	Manganese	CNS	0.0026	NA	--	0.0026
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.31	NA	--	0.31
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00059	NA	--	0.00059
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.00046	NA	--	0.00046
			Silver	--	NA	--	--	Silver	Skin (argyria)	0.00080	NA	--	0.00080
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.0095	NA	--	0.010
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0015	NA	--	0.0015
			Zinc	--	NA	--	--	Zinc	Blood	0.011	NA	--	0.011
			Bis[2-ethylhexyl]phthalate	2E-8	NA	5E-9	2E-8	Bis[2-ethylhexyl]phthalate	Increased liver weight	0.00044	NA	0.00014	0.00058
			Benz[a]anthracene	4E-8	NA	2E-8	6E-8	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	5E-7	NA	2E-7	7E-7	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	5E-8	NA	2E-8	8E-8	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	2E-7	NA	6E-8	2E-7	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	3E-8	NA	1E-8	4E-8	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			Napthalene	--	NA	--	--	Napthalene	Body weight	0.000046	NA	0.000019	0.000065
			2-Methlynapthalene	--		--		2-Methlynapthalene	Body weight	0.000022		0.0000093	0.000032
			PCBs	2E-7	NA	9E-8	3E-7	PCBs	Immunologic	0.040	NA	0.018	0.058
			(Total)	1E-6		4E-7	2E-6	(Total)		0.44		0.019	0.46
Sediment	Sediment	Undeveloped Area Surface Sediment	Aluminum	--	NA	--	--	Aluminum	ND	0.0025	NA	--	0.0025
			Arsenic	3E-7	NA	3E-8	3E-7	Arsenic	Skin/vascular	0.0053	NA	0.00051	0.0058
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00017	NA	0.000011	0.00018
			Chromium	--	NA	--	--	Chromium	ND	0.0094	NA	--	0.0094
			Iron	--	NA	--	--	Iron	ND	0.013	NA	--	0.013
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.78	NA	--	0.78
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00023	NA	--	0.00023
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.011	NA	--	0.011
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0014	NA	--	0.0014
			Zinc	--	NA	--	--	Zinc	Blood	0.0021	NA	--	0.0021
			Benz[a]anthracene	3E-8	NA	1E-8	4E-8	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	3E-7	NA	1E-7	4E-7	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	3E-8	NA	1E-8	4E-8	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	5E-8	NA	2E-8	8E-8	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	2E-8	NA	9E-9	3E-8	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			PCBs	3E-8	NA	2E-8	5E-8	PCBs	Immunologic	0.0068	NA	0.0030	0.010
			(Total)	8E-7		2E-7	1E-6	(Total)		0.83		0.0085	0.84
Surface Water	Surface Water	Undeveloped Area Surface Water	Iron	--	NA	--	--	Iron	ND	0.00019	NA	0.000063	0.00025
			Manganese	--	NA	--	--	Manganese	CNS	0.00019	NA	0.0016	0.0018
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.0013	NA	0.0061	0.0074
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00000060	NA	0.00000020	0.00000081
			(Total)	0E+0		0E+0	0E+0	(Total)		0.0017		0.0078	0.0094
			Total Risk Across All Media and Exposure Routes:				3E-6		Total Hazard Index Across All Media and Exposure Routes:				1.3

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
PCBs - Polychlorinated biphenyls
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS HI=	0.0053
Total immune HI=	1.2
Total kidney HI=	0.0044
Total liver HI=	0.020
Total skin HI=	0.00080
Total cardiovascular HI=	0.012
Total metabolic HI=	0.0058
Total blood HI=	0.016
Total body/organ weight HI=	0.0010
Total other HI=	0.074

Table 9.6.Central Tendency
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Future Hypothetical
Receptor Population: Resident - domestic use of groundwater
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Groundwater	Air	Indoor Air (showering/ bathing)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.088	NA	0.088
			Benzene	NA	6E-6	NA	6E-6	Benzene	Hematopoietic	NA	0.19	NA	0.19
			Bis[2-ethylhexyl]phthalate	NA	9E-7	NA	9E-7	Bis[2-ethylhexyl]phthalate	Increased liver weight	NA	0.024	NA	0.024
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.033	NA	0.033
			Chloroethane	NA	3E-7	NA	3E-7	Chloroethane	ND	NA	0.00024	NA	0.00024
			1,4-Dichlorobenzene	NA	1E-6	NA	1E-6	1,4-Dichlorobenzene	Increased liver weight	NA	0.0015	NA	0.0015
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.053	NA	0.053
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.036	NA	0.036
			4-Methylphenol	NA	--	NA	--	4-Methylphenol	ND	NA	0.23	NA	0.23
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.030	NA	0.030
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.18	NA	0.18
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	1.7	NA	1.7
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.10	NA	0.10
			(Total)	NA	8E-6	NA	8E-6	(Total)		NA	2.7	NA	2.7
Groundwater	Groundwater	Groundwater Sitewide	Arsenic	3E-5	NA	4E-8	3E-5	Arsenic	Skin/vascular	0.50	NA	0.00064	0.50
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.11	NA	0.0021	0.11
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.0050	NA	0.00026	0.0052
			Copper	--	NA	--	--	Copper	ND	0.0076	NA	0.0010	0.0085
			Iron	--	NA	--	--	Iron	ND	0.98	NA	0.0013	1.0
			Manganese	--	NA	--	--	Manganese	CNS	0.77	NA	0.025	0.79
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.53	NA	0.0097	0.54
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.0043	NA	0.0000055	0.0043
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.021	NA	0.000069	0.022
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.70	NA	0.00089	0.70
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.053	NA	0.0026	0.055
			Acetone	--	NA	--	--	Acetone	Kidney	0.0011	NA	0.0000021	0.0011
			Benzene	1E-6	NA	4E-8	1E-6	Benzene	Hematopoietic	0.049	NA	0.0013	0.050
			Chlorobenzene	--	NA	--	--	Chlorobenzene	Liver	0.0078	NA	0.00041	0.0082
			Chloroethane	5E-8	NA	5E-10	5E-8	Chloroethane	ND	0.00030	NA	0.0000031	0.00031
			1,2-Dichloroethene, isomers	--	NA	--	--	1,2-Dichloroethene, isomers	Serum enzymes	0.0080	NA	0.000013	0.0080
			1,4-Dichlorobenzene	2E-7	NA	2E-8	3E-7	1,4-Dichlorobenzene	ND	0.0026	NA	0.00020	0.0028
			4-Methyl-2-pentanone	--	NA	--	--	4-Methyl-2-pentanone	ND	0.0017	NA	0.000000080	0.0017
			4-Methylphenol	--	NA	--	--	4-Methylphenol	ND	0.036	NA	0.00020	0.036
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.026	NA	0.0015	0.027
			Xylene	--	NA	--	--	Xylene	Hyperactivity, body wt, mortality	0.0036	NA	0.00037	0.0039
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.0010	NA	0.000085	0.0010
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.012	NA	0.0011	0.013
			(Total)	3E-5		9E-8	3E-5	(Total)		3.8		0.048	3.9
			Total Risk Across All Media and Exposure Routes:				4E-05		Total Risk Across All Media and Exposure Routes:				6.6

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS HI=	1.0
Total immune HI=	0.54
Total kidney HI=	0.21
Total liver HI=	0.71
Total body weight HI =	0.089
Total blood HI =	0.30
Total cardiovascular HI =	0.50
Total other HI =	3.0

Table 9.9.Central Tendency
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Future Hypothetical
Receptor Population: Resident - domestic use of groundwater
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Groundwater	Air	Indoor Air (showering/ bathing)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.21	NA	0.21
			Benzene	NA	9E-6	NA	9E-6	Benzene	Hematopoietic	NA	0.46	NA	0.46
			Bis(2-ethylhexyl)phthalate	NA	1E-6	NA	1E-6	Bis(2-ethylhexyl)phthalate	Increased liver weight	NA	0.056	NA	0.056
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.077	NA	0.077
			Chloroethane	NA	4E-7	NA	4E-7	Chloroethane	ND	NA	0.00056	NA	0.00056
			1,4-Dichlorobenzene	NA	2E-6	NA	2E-6	1,4-Dichlorobenzene	Increased liver weight	NA	0.0036	NA	0.0036
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.12	NA	0.12
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.085	NA	0.085
			4-Methylphenol	NA	--	NA	--	4-Methylphenol	ND	NA	0.53	NA	0.53
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.070	NA	0.070
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.42	NA	0.42
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	4.1	NA	4.1
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.24	NA	0.24
			(Total)	NA	1E-5	NA	1E-5	(Total)		NA	6.9	NA	6.9
Groundwater	Groundwater	Groundwater Sitewide	Arsenic	5E-5	NA	6E-6	5E-5	Arsenic	Skin/vascular	0.11	NA	0.0015	0.11
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.024	NA	0.0049	0.029
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.0011	NA	0.00061	0.0017
			Copper	--	NA	--	--	Copper	ND	0.0016	NA	0.0023	0.0039
			Iron	--	NA	--	--	Iron	ND	0.21	NA	0.0030	0.21
			Manganese	--	NA	--	--	Manganese	CNS	0.16	NA	0.059	0.22
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.11	NA	0.023	0.14
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00091	NA	0.000013	0.00093
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.0045	NA	0.00017	0.0047
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.15	NA	0.0021	0.15
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.011	NA	0.0062	0.017
			Acetone	--	NA	--	--	Acetone	Kidney	0.00024	NA	0.0000049	0.00025
			Benzene	2E-6	NA	6E-6	2E-6	Benzene	Hematopoietic	0.010	NA	0.0032	0.014
			Chlorobenzene	--	NA	--	--	Chlorobenzene	Liver	0.0016	NA	0.00098	0.0026
			Chloroethane	7E-8	NA	7E-10	7E-8	Chloroethane	ND	0.000064	NA	0.0000074	0.000071
			1,2-Dichloroethene, isomers	--	NA	--	--	1,2-Dichloroethene, isomers	Serum enzymes	0.0017	NA	0.000032	0.0017
			1,4-Dichlorobenzene	4E-7	NA	3E-6	4E-7	1,4-Dichlorobenzene	ND	0.00054	NA	0.00049	0.0010
			4-Methyl-2-pentanone	--	NA	--	--	4-Methyl-2-pentanone	ND	0.00036	NA	0.00000019	0.00037
			4-Methylphenol	--	NA	--	--	4-Methylphenol	ND	0.0078	NA	0.00048	0.0081
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.0055	NA	0.0036	0.0091
			Xylene	--	NA	--	--	Xylene	Hyperactivity, body wt, mortality	0.00075	NA	0.00089	0.0016
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.00020	NA	0.00020	0.00041
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.0026	NA	0.0026	0.0052
			(Total)	5E-5		1E-7	5E-5	(Total)		0.81		0.12	0.92
			Total Risk Across All Media and Exposure Routes:				6E-05		Total Risk Across All Media and Exposure Routes:				7.9

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS HI=	0.71
Total immune HI=	0.14
Total kidney HI=	0.24
Total liver HI=	0.15
Total body weight HI =	0.079
Total blood HI =	0.49
Total cardiovascular HI =	0.11
Total other HI =	4.8

Table 10.1.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Current
Receptor Population: Long-term Worker - Developed Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal *	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal *	Exposure Routes Total
Air	Air	Outdoor Air	Mercury vapor	NA	--	NA	--	Mercury vapor	CNS	NA	0.025	NA	0.025
			(Total)	NA	0E+0	NA	0E+0	(Total)			0.025		0.025
Subsurface Soil	Air	Indoor Air (derived from subsurface soil)	Benzene	NA	1E-5	NA	1E-5	Benzene	Hematopoietic	NA	0.17	NA	0.17
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.16	NA	0.16
			(Total)	NA	1E-5	NA	1E-5	(Total)			0.33		0.33
Groundwater	Air	Indoor Air (derived from groundwater)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.000043	NA	0.000043
			Benzene	NA	1E-7	NA	1E-7	Benzene	Hematopoietic	NA	0.0013	NA	0.0013
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.00029	NA	0.00029
			Chloroethane	NA	4E-8	NA	4E-8	Chloroethane	ND	NA	0.000012	NA	0.000012
			1,4-Dichlorobenzene	NA	1E-8	NA	1E-8	1,4-Dichlorobenzene	Increased liver weight	NA	0.0000067	NA	0.0000067
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.00051	NA	0.00051
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.000033	NA	0.000033
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.0029	NA	0.0029
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.0013	NA	0.0013
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	0.0022	NA	0.0022
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.00015	NA	0.00015
			(Total)	NA	2E-7	NA	2E-7	(Total)		NA	0.0088	NA	0.0088
Surface Soil	Surface Soil	Developed Area Surface Soil (unpaved)	Aluminum	--	NA	--	--	Aluminum	ND	0.0059	NA	--	0.0059
			Arsenic	3.E-6	NA	1E-6	4E-6	Arsenic	Skin/Vascular	0.018	NA	0.0071	0.025
			Chromium	--	NA	--	--	Chromium	ND	0.016	NA	--	0.016
			Copper	--	NA	--	--	Copper	ND	0.0057	NA	--	0.0057
			Iron	--	NA	--	--	Iron	ND	0.038	NA	--	0.038
			Manganese	--	NA	--	--	Manganese	CNS	0.0057	NA	--	0.0057
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.51	NA	--	0.51
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0076	NA	--	0.0076
			Benzo[a]pyrene	5.E-7	NA	9E-7	1E-6	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	1.E-7	NA	2E-7	3E-7	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	9.E-8	NA	2E-7	2E-7	Dibenz[a,h]anthracene	ND	--	NA	--	--
			(Total)	4E-6		2E-6	6E-6	(Total)		0.60		0.0071	0.61
			Total Risk Across All Media and Exposure Routes:				2E-6		Total Hazard Index Across All Media and Exposure Routes:				0.97

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
* Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.035
Total immune HI=	0.51
Total liver HI=	0.0000067
Total cardiovascular HI=	0.025
Total blood HI=	0.18
Total body/organ weight HI=	0.0000067
Total other HI=	0.23

Table 10.2.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Receptor Population: Long-term Worker - Developed Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Air	Air	Outdoor Air	Mercury vapor	NA	--	NA	--	Mercury vapor	CNS	NA	0.025	NA	0.025
			(Total)	NA	0E+0	NA	0E+0	(Total)			0.025		0.025
Subsurface Soil	Air	Indoor Air (derived from subsurface soil)	Benzene	NA	1E-5	NA	1E-5	Benzene	Hematopoietic	NA	0.17	NA	0.17
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.16	NA	0.16
			(Total)	NA	1E-5	NA	1E-5	(Total)			0.33		0.33
Groundwater	Air	Indoor Air (derived from groundwater)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.000043	NA	0.000043
			Benzene	NA	1E-7	NA	1E-7	Benzene	Hematopoietic	NA	0.0013	NA	0.0013
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.00029	NA	0.00029
			Chloroethane	NA	4E-8	NA	4E-8	Chloroethane	ND	NA	0.000012	NA	0.000012
			1,4-Dichlorobenzene	NA	1E-8	NA	1E-8	1,4-Dichlorobenzene	Increased liver weight	NA	0.0000067	NA	0.0000067
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.00051	NA	0.00051
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.000033	NA	0.000033
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.0029	NA	0.0029
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.0013	NA	0.0013
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	0.0022	NA	0.0022
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.00015	NA	0.00015
			(Total)	NA	2E-7	NA	2E-7	(Total)		NA	0.0088	NA	0.0088
Surface Soil	Surface Soil	Developed Area Surface Soil (all)	Aluminum	--	NA	--	--	Aluminum	ND	0.0059	NA	--	0.0059
			Arsenic	3.E-6	NA	1E-6	4E-6	Arsenic	Skin/vascular	0.018	NA	0.0071	0.025
			Chromium	--	NA	--	--	Chromium	ND	0.012	NA	--	0.012
			Copper	--	NA	--	--	Copper	ND	0.0084	NA	--	0.0084
			Iron	--	NA	--	--	Iron	ND	0.035	NA	--	0.035
			Manganese	--	NA	--	--	Manganese	CNS	0.0042	NA	--	0.0042
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	3.7	NA	--	3.7
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.015	NA	--	0.015
			Vanadium	--	NA	--	--	Vanadium	Hematopoistic	0.0076	NA	--	0.0076
			Benzene	3.E-9	NA	--	3E-9	Benzene	Hematopoietic	0.000035	NA		0.000035
			Benz[a]anthracene	1.E-7	NA	2E-7	3E-7	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	9.E-7	NA	1E-6	2E-6	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	1.E-7	NA	2E-7	4E-7	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	2.E-7	NA	3E-7	5E-7	Dibenz[a,h]anthracene	ND	--	NA	--	--
			(Total)	4E-6		3E-6	8E-6	(Total)		3.8		0.0071	3.8

Table 10.2.RME (continued)
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Receptor Population: Long-term Worker - Developed Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Groundwater	Groundwater	Groundwater Sitewide	Arsenic	4E-5	NA	1E-9	4E-5	Arsenic	Skin/vascular	0.25	NA	0.000012	0.25
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.057	NA	0.000039	0.057
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.0025	NA	0.0000048	0.0025
			Copper	--	NA	--	--	Copper	ND	0.0039	NA	0.000018	0.0039
			Iron	--	NA	--	--	Iron	ND	0.50	NA	0.000024	0.50
			Manganese	--	NA	--	--	Manganese	CNS	0.39	NA	0.00047	0.39
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.27	NA	0.00018	0.27
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.0022	NA	0.00000010	0.0022
			Nickel	--	NA	--	--	Nickel	Decreased body/organ weights	0.011	NA	0.0000013	0.011
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.35	NA	0.000017	0.35
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.027	NA	0.000049	0.027
			Acetone	--	NA	--	--	Acetone	Kidney	0.00058	NA	0.000000039	0.00058
			Benzene	2E-6	NA	1E-9	2E-6	Benzene	Hematopoietic	0.025	NA	0.000025	0.025
			Chlorobenzene	--	NA	--	--	Chlorobenzene	Liver	0.0040	NA	0.0000077	0.0040
			Chloroethane	6E-8	NA	2E-11	6E-8	Chloroethane	ND	0.00015	NA	0.000000059	0.0002
			1,2-Dichloroethene, isomers	--	NA	--	--	1,2-Dichloroethene, isomers	Serum enzymes	0.0041	NA	0.00000025	0.0041
			1,4-Dichlorobenzene	3E-7	NA	7E-10	3E-7	1,4-Dichlorobenzene	ND	0.0013	NA	0.0000038	0.0013
			4-Methyl-2-pentanone	--	NA	--	--	4-Methyl-2-pentanone	ND	0.00088	NA	0.0000000015	0.00088
			4-Methylphenol	--	NA	--	--	4-Methylphenol	ND	0.018	NA	0.0000038	0.018
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.013	NA	0.000028	0.013
			Xylene	--	NA	--	--	Xylene	Hyperactivity, body wt, mortality	0.0018	NA	0.0000070	0.0018
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.00049	NA	0.0000016	0.00049
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.0063	NA	0.000021	0.0063
			(Total)	4E-5		3E-9	4E-5	(Total)		2.0		0.00091	2.0
			Total Risk Across All Media and Exposure Routes:				7E-5		Total Hazard Index Across All Media and Exposure Routes:				6.1

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.43
Total immune HI=	3.9
Total kidney HI=	0.073
Total liver HI=	0.37
Total cardiovascular HI=	0.28
Total blood HI=	0.24
Total body/organ weight HI=	0.031
Total other HI=	0.76

Table 10.3.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Receptor Population: Long-term Worker - Undeveloped Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Air	Air	Outdoor Air	Mercury vapor	NA	--	NA	--	Mercury vapor	CNS	NA	0.025	NA	0.025
			(Total)		0E+0		0E+0	(Total)			0.025		0.025
Subsurface Soil	Air	Indoor Air (derived from subsurface soil)	Carbazole	NA	5E-11	NA	5E-11	Carbazole	ND	NA	--	NA	--
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.027	NA	0.027
			Xylenes	NA	--	NA		Xylenes	CNS	NA	0.17	NA	0.17
			Benz[a]anthracene	NA	4E-8	NA	4E-8	Benz[a]anthracene	ND	NA	--	NA	--
			Benzo[a]pyrene	NA	4E-7	NA	4E-7	Benzo[a]pyrene	ND	NA	--	NA	--
			Benzo[b]fluoranthene	NA	5E-8	NA	5E-8	Benzo[b]fluoranthene	ND	NA	--	NA	--
			Benzo[ghi]perylene	NA	--	NA	--	Benzo[ghi]perylene	ND	NA	0.000071	NA	0.000071
			Benzo[k]fluoranthene	NA	1E-9	NA	1E-9	Benzo[k]fluoranthene	ND	NA	--	NA	--
			Dibenz[a,h]anthracene	NA	5E-8	NA	5E-8	Dibenz[a,h]anthracene	ND	NA	--	NA	--
			Indeno[1,2,3-cd]pyrene	NA	2E-8	NA	2E-8	Indeno[1,2,3-cd]pyrene	ND	NA	--	NA	--
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.16	NA	0.16
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	0.41	NA	0.41
			(Total)	NA	5E-7	NA	5E-7	(Total)		NA	0.76	NA	0.76
Groundwater	Air	Indoor Air (derived from groundwater)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.000043	NA	0.000043
			Benzene	NA	1E-7	NA	1E-7	Benzene	Hematopoietic	NA	0.0013	NA	0.0013
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.00029	NA	0.00029
			Chloroethane	NA	4E-8	NA	4E-8	Chloroethane	ND	NA	0.000012	NA	0.000012
			1,4-Dichlorobenzene	NA	1E-8	NA	1E-8	1,4-Dichlorobenzene	Increased liver weight	NA	0.0000067	NA	0.0000067
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.00051	NA	0.00051
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.000033	NA	0.000033
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.0029	NA	0.0029
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.0013	NA	0.0013
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	0.0022	NA	0.0022
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.00015	NA	0.00015
			(Total)	NA	2E-7	NA	2E-7	(Total)		NA	0.0088	NA	0.0088
Surface Soil	Surface Soil	Undeveloped Area Surface Soil	Aluminum	--	NA	--	--	Aluminum	ND	0.0030	NA	--	0.0030
			Antimony	--	NA	--	--	Antimony	Longevity; metabolic	0.016	NA	--	0.016
			Arsenic	3E-6	NA	1E-6	4E-6	Arsenic	Skin/vascular	0.016	NA	0.0062	0.022
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.011	NA	--	0.011
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00073	NA	0.00019	0.00092
			Chromium	--	NA	--	--	Chromium	ND	0.064	NA	--	0.064
			Copper	--	NA	--	--	Copper	ND	0.0072	NA	--	0.0072
			Iron	--	NA	--	--	Iron	ND	0.056	NA	--	0.056
			Manganese	--	NA	--	--	Manganese	CNS	0.0071	NA	--	0.0071
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.83	NA	--	0.83
			Methylmercury	--	NA	--		Methylmercury	Neurologic	0.0016	NA	--	0.0016
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.0013	NA	--	0.0013
			Silver	--	NA	--	--	Silver	Skin (argyria)	0.0022	NA	--	0.0022
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.026	NA	--	0.026
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0040	NA	--	0.0040
			Zinc	--	NA	--	--	Zinc	Blood	0.030	NA	--	0.030
			Bis[2-ethylhexyl]phthalate	1E-7	NA	2E-7	3E-7	Bis[2-ethylhexyl]phthalate	Increased liver weight	0.0012	NA	0.0016	0.0028
			Benz[a]anthracene	3E-7	NA	5E-7	8E-7	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	4E-6	NA	6E-6	1E-5	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	4E-7	NA	7E-7	1E-6	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	1E-6	NA	2E-6	3E-6	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	2E-7	NA	4E-7	6E-7	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.000060	NA	0.00021	0.00027
			2-Methylnaphthalene	--		--	--	2-Methylnaphthalene	Body weight	0.000060	NA	0.00010	0.00016
			PCBs	2E-6	NA	3E-6	4E-6	PCBs	Immunologic	0.11	NA	0.20	0.31
			(Total)	1E-5		1E-5	2E-5	(Total)		1.2		0.21	1.4

Table 10.3.RME (continued)
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Receptor Population: Long-term Worker - Undeveloped Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Groundwater	Groundwater	Groundwater Sitewide	Arsenic	4E-5	NA	1E-9	4E-5	Arsenic	Skin/vascular	0.25	NA	0.000012	0.25
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.057	NA	0.000039	0.057
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.0025	NA	0.0000048	0.0025
			Copper	--	NA	--	--	Copper	ND	0.0039	NA	0.000018	0.0039
			Iron	--	NA	--	--	Iron	ND	0.50	NA	0.000024	0.50
			Manganese	--	NA	--	--	Manganese	CNS	0.39	NA	0.00047	0.39
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.27	NA	0.00018	0.27
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.0022	NA	0.00000010	0.0022
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.011	NA	0.0000013	0.011
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.35	NA	0.000017	0.35
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.027	NA	0.000049	0.027
			Acetone	--	NA	--	--	Acetone	Kidney	0.00058	NA	0.000000039	0.00058
			Benzene	2E-6	NA	1E-9	2E-6	Benzene	Hematopoietic	0.025	NA	0.000025	0.025
			Chlorobenzene	--	NA	--	--	Chlorobenzene	Liver	0.0040	NA	0.0000077	0.0040
			Chloroethane	6E-6	NA	2E-11	6E-6	Chloroethane	ND	0.00015	NA	0.000000059	0.00015
			1,2-Dichloroethene, isomers	--	NA	--	--	1,2-Dichloroethene, isomers	Serum enzymes	0.0041	NA	0.00000025	0.0041
			1,4-Dichlorobenzene	3E-7	NA	7E-10	3E-7	1,4-Dichlorobenzene	ND	0.0013	NA	0.0000038	0.0013
			4-Methyl-2-pentanone	--	NA	--	--	4-Methyl-2-pentanone	ND	0.00088	NA	0.0000000015	0.00088
			4-Methylphenol	--	NA	--	--	4-Methylphenol	ND	0.018	NA	0.0000038	0.018
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.013	NA	0.000028	0.013
			Xylene	--	NA	--	--	Xylene	Hyperactivity, body wt, mortality	0.0018	NA	0.0000070	0.0018
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.00049	NA	0.0000016	0.00049
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.0063	NA	0.000021	0.0063
			(Total)	4E-5		3E-9	4E-5	(Total)		2.0		0.00091	2.0
			Total Risk Across All Media and Exposure Routes:				7E-5			Total Hazard Index Across All Media and Exposure Routes:			4.1

Notes:

NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
PCBs - Polychlorinated biphenyls

[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.63
Total immune HI=	1.4
Total kidney HI=	0.072
Total liver HI=	0.39
Total cardiovascular HI=	0.28
Total skin HI=	0.0022
Total metabolic HI =	0.016
Total blood HI=	0.087
Total body/organ weight HI=	0.036
Total other HI=	1.2

Table 10.4.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor - Undeveloped Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Surface Soil	Surface Soil	Undeveloped Area Surface Soil	Aluminum	--	NA	--	--	Aluminum	ND	0.0032	NA	--	0.0032
			Antimony	--	NA	--	--	Antimony	Longevity; metabolic	0.016	NA	--	0.016
			Arsenic	3E-6	NA	4E-7	4E-6	Arsenic	Skin/vascular	0.017	NA	0.0020	0.019
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.011	NA	--	0.011
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00077	NA	0.000061	0.00083
			Chromium	--	NA	--	--	Chromium	ND	0.067	NA	--	0.067
			Copper	--	NA	--	--	Copper	ND	0.0076	NA	--	0.0076
			Iron	--	NA	--	--	Iron	ND	0.060	NA	--	0.060
			Manganese	--	NA	--	--	Manganese	CNS	0.0075	NA	--	0.0075
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.87	NA	--	0.87
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.0017	NA	--	0.0017
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.0013	NA	--	0.0013
			Silver	--	NA	--	--	Silver	Skin (argyria)	0.0023	NA	--	0.0023
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.027	NA	--	0.027
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0042	NA	--	0.0042
			Zinc	--	NA	--	--	Zinc	Blood	0.032	NA	--	0.032
			Bis[2-ethylhexyl]phthalate	2E-7	NA	6E-8	2E-7	Bis[2-ethylhexyl]phthalate	Increased liver weight	0.0013	NA	0.0005	0.0018
			Benz[a]anthracene	4E-7	NA	2E-7	6E-7	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	5E-6	NA	2E-6	7E-6	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	5E-7	NA	3E-7	8E-7	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	1E-6	NA	8E-7	2E-6	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	3E-7	NA	1E-7	4E-7	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			Napthalene	--				Napthalene	Body weight	0.00013		0.000068	0.00020
			2-Methylnapthalene	--	NA	--	--	2-Methylnapthalene	Body weight	0.000064	NA	0.000033	0.00010
			PCBs	2E-6	NA	1E-6	3E-6	PCBs	Immunologic	0.11	NA	0.063	0.18
			(Total)	1E-5		5E-6	2E-5	(Total)		1.2		0.066	1.3
Sediment	Sediment	Undeveloped Area Surface Sediment	Aluminum	--	NA	--	--	Aluminum	ND	0.0072	NA	--	0.0072
			Arsenic	3E-6	NA	3E-7	3E-6	Arsenic	Skin/vascular	0.015	NA	0.0018	0.017
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00047	NA	0.000038	0.00051
			Chromium	--	NA	--	--	Chromium	ND	0.027	NA	--	0.027
			Iron	--	NA	--	--	Iron	ND	0.037	NA	--	0.037
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	2.2	NA	--	2.2
			Methylmercury	--		--	--	Methylmercury	Neurologic	0.00065	NA	--	0.00065
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.031	NA	--	0.031
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0040	NA	--	0.0040
			Zinc	--	NA	--	--	Zinc	Blood	0.0061	NA	--	0.0061
			Benz[a]anthracene	3E-7	NA	1E-7	4E-7	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	3E-6	NA	1E-6	4E-6	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	3E-7	NA	2E-7	4E-7	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	5E-7	NA	3E-7	8E-7	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	2E-7	NA	1E-7	3E-7	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			PCBs	3E-7	NA	2E-7	5E-7	PCBs	Immunologic	0.019	NA	0.011	0.029
			(Total)	7E-6		3E-6	1E-5	(Total)		2.4		0.012	2.4
Surface Water	Surface Water	Undeveloped Area Surface Water	Iron	--	NA	--	--	Iron	ND	0.00054	NA	0.00026	0.00080
			Manganese	--	NA	--	--	Manganese	CNS	0.00055	NA	0.0065	0.0071
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.0036	NA	0.025	0.028
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.0000017	NA	0.00000082	0.0000025
			(Total)	0E+0		0E+0	0E+0	(Total)		0.0047		0.031	0.036
			Total Risk Across All Media and Exposure Routes:				3E-5		Total Hazard Index Across All Media and Exposure Routes:				3.7

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
PCBs - Polychlorinated biphenyls
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.017
Total immune HI=	3.3
Total kidney HI=	0.013
Total liver HI=	0.058
Total skin HI=	0.0023
Total cardiovascular HI=	0.035
Total metabolic HI=	0.016
Total blood HI=	0.046
Total body/organ weight HI=	0.0034
Total other HI=	0.21

Table 10.5.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor - Undeveloped Area
Receptor Age: Adolescent/Pre-Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Surface Soil	Surface Soil	Undeveloped Area Surface Soil	Aluminum	--	NA	--	--	Aluminum	ND	0.0045	NA	--	0.0045
			Antimony	--	NA	--	--	Antimony	Longevity; metabolic	0.023	NA	--	0.023
			Arsenic	1E-6	NA	3E-7	2E-6	Arsenic	Skin/vascular	0.024	NA	0.0057	0.029
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.016	NA	--	0.016
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.0011	NA	0.00018	0.0013
			Chromium	--	NA	--	--	Chromium	ND	0.096	NA	--	0.096
			Copper	--	NA	--	--	Copper	ND	0.011	NA	--	0.011
			Iron	--	NA	--	--	Iron	ND	0.085	NA	--	0.085
			Manganese	--	NA	--	--	Manganese	CNS	0.011	NA	--	0.011
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	1.2	NA	--	1.2
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.0024	NA	--	0.0024
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.0019	NA	--	0.0019
			Silver	--	NA	--	--	Silver	Skin (argyria)	0.0033	NA	--	0.0033
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.039	NA	--	0.039
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0060	NA	--	0.0060
			Zinc	--	NA	--	--	Zinc	Blood	0.045	NA	--	0.045
			Bis[2-ethylhexyl]phthalate	6E-6	NA	5E-6	1E-7	Bis[2-ethylhexyl]phthalate	Increased liver weight	0.0018	NA	0.0014	0.0032
			Benz[a]anthracene	2E-7	NA	2E-7	3E-7	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	2E-6	NA	2E-6	4E-6	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	2E-7	NA	2E-7	4E-7	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	6E-7	NA	6E-7	1E-6	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	1E-7	NA	1E-7	2E-7	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			Napthalene	--	NA	--	--	Napthalene	Body weight	0.00019	NA	0.00020	0.00038
			2-Methlynapthalene	--	NA	--	--	2-Methlynapthalene	Body weight	0.000091		0.000095	0.00019
			PCBs	8E-7	NA	9E-7	2E-6	PCBs	Immunologic	0.16	NA	0.18	0.34
			(Total)	5E-6		5E-6	1E-5	(Total)		1.8		0.19	2.0
Sediment	Sediment	Undeveloped Area Surface Sediment	Aluminum	--	NA	--	--	Aluminum	ND	0.010	NA	--	0.010
			Arsenic	1E-6	NA	3E-7	2E-6	Arsenic	Skin/vascular	0.022	NA	0.0052	0.027
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00067	NA	0.00011	0.00078
			Chromium	--	NA	--	--	Chromium	ND	0.038	NA	--	0.038
			Iron	--	NA	--	--	Iron	ND	0.053	NA	--	0.053
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	3.2	NA	--	3.2
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00093	NA	--	0.00093
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.044	NA	--	0.044
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0057	NA	--	0.0057
			Zinc	--	NA	--	--	Zinc	Blood	0.0087	NA	--	0.0087
			Benz[a]anthracene	1E-7	NA	1E-7	2E-7	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	1E-6	NA	1E-6	2E-6	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	1E-7	NA	1E-7	3E-7	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	2E-7	NA	2E-7	5E-7	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	8E-8	NA	9E-8	2E-7	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			PCBs	1E-7	NA	2E-7	3E-7	PCBs	Immunologic	0.027	NA	0.030	0.057
			(Total)	3E-6		2E-6	5E-6	(Total)		3.4		0.035	3.4
Surface Water	Surface Water	Undeveloped Area Surface Water	Iron	--	NA	--	--	Iron	ND	0.00077	NA	0.00026	0.0010
			Manganese	--	NA	--	--	Manganese	CNS	0.00078	NA	0.0065	0.0073
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.0052	NA	0.025	0.030
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.0000825	NA	0.00000082	0.0000033
			(Total)	0E+0		0E+0	0E+0	(Total)		0.0068		0.032	0.038
			Total Risk Across All Media and Exposure Routes:				2E-5		Total Hazard Index Across All Media and Exposure Routes:				5.4

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
PCBs - Polychlorinated biphenyls
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total body/organ weight HI=	0.0051
Total other HI=	0.90

Total CNS HI=	0.021
Total immune HI=	4.9
Total kidney HI=	0.018
Total liver HI=	0.083
Total skin HI=	0.0033
Total cardiovascular HI=	0.056
Total metabolic HI=	0.023
Total blood HI=	0.066

Table 10.6.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Future Hypothetical
Receptor Population: Resident - domestic use of groundwater
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Groundwater	Air	Indoor Air (showering/ bathing)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.20	NA	0.20
			Benzene	NA	5E-5	NA	5E-5	Benzene	Hematopoietic	NA	0.45	NA	0.45
			Bis[2-ethylhexyl]phthalate	NA	7E-6	NA	7E-6	Bis[2-ethylhexyl]phthalate	Increased liver weight	NA	0.055	NA	0.055
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.076	NA	0.076
			Chloroethane	NA	2E-6	NA	2E-6	Chloroethane	ND	NA	0.00055	NA	0.00055
			1,4-Dichlorobenzene	NA	8E-6	NA	8E-6	1,4-Dichlorobenzene	Increased liver weight	NA	0.0036	NA	0.0036
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.12	NA	0.12
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.084	NA	0.084
			4-Methylphenol	NA	--	NA	--	4-Methylphenol	ND	NA	0.53	NA	0.53
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.069	NA	0.069
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.41	NA	0.41
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	4.0	NA	4.0
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.24	NA	0.24
			(Total)	NA	6E-5	NA	6E-5	(Total)		NA	6.3	NA	6.3
Groundwater	Groundwater	Groundwater Sitewide	Arsenic	1E-4	NA	3E-7	1E-4	Arsenic	Skin/vascular	0.71	NA	0.0016	0.71
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.16	NA	0.0051	0.16
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.0071	NA	0.00064	0.0078
			Copper	--	NA	--	--	Copper	ND	0.011	NA	0.0024	0.013
			Iron	--	NA	--	--	Iron	ND	1.4	NA	0.0032	1.4
			Manganese	--	NA	--	--	Manganese	CNS	1.1	NA	0.062	1.2
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.76	NA	0.024	0.78
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.0062	NA	0.000014	0.0062
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.031	NA	0.00017	0.031
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.99	NA	0.0022	1.0
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.075	NA	0.0065	0.082
			Acetone	--	NA	--	--	Acetone	Kidney	0.0016	NA	0.0000051	0.0016
			Benzene	7E-6	NA	3E-7	7E-6	Benzene	Hematopoietic	0.070	NA	0.0033	0.073
			Chlorobenzene	--	NA	--	--	Chlorobenzene	Liver	0.011	NA	0.0010	0.012
			Chloroethane	2E-7	NA	4E-9	2E-7	Chloroethane	ND	0.00043	NA	0.0000078	0.00044
			1,2-Dichloroethene, isomers	--	NA	--	--	1,2-Dichloroethene, isomers	Serum enzymes	0.011	NA	0.000033	0.011
			1,4-Dichlorobenzene	1E-6	NA	2E-7	1E-6	1,4-Dichlorobenzene	ND	0.0037	NA	0.00051	0.0042
			4-Methyl-2-pentanone	--	NA	--	--	4-Methyl-2-pentanone	ND	0.0025	NA	0.000000060	0.0025
			4-Methylphenol	--	NA	--	--	4-Methylphenol	ND	0.052	NA	0.00050	0.052
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.037	NA	0.0038	0.041
			Xylene	--	NA	--	--	Xylene	Hyperactivity, body wt, mortality	0.0051	NA	0.00093	0.0060
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.0014	NA	0.00021	0.0016
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.018	NA	0.0027	0.020
			(Total)	1E-4		8E-7	1E-4	(Total)		5.5		0.12	5.6
			Total Risk Across All Media and Exposure Routes:				2E-4			Total Risk Across All Media and Exposure Routes:			12

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS HI=	1.7
Total immune HI=	0.78
Total kidney HI=	0.38
Total liver HI=	1.0
Total body weight HI =	0.16
Total blood HI =	0.61
Total cardiovascular HI =	0.71
Total other HI =	6.0

Table 10.7.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Ventron/Velsicol Site OU1

Scenario Timeframe: Future Hypothetical
Receptor Population: Resident - domestic use of groundwater
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Groundwater	Air	Indoor Air (showering/ bathing)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.62	NA	0.62
			Benzene	NA	3E-5	NA	3E-5	Benzene	Hematopoietic	NA	1.4	NA	1.4
			Bis[2-ethylhexyl]phthalate	NA	4E-6	NA	4E-6	Bis[2-ethylhexyl]phthalate	Increased liver weight	NA	0.17	NA	0.17
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.23	NA	0.23
			Chloroethane	NA	1E-6	NA	1E-6	Chloroethane	ND	NA	0.0017	NA	0.0017
			1,4-Dichlorobenzene	NA	5E-6	NA	5E-6	1,4-Dichlorobenzene	Increased liver weight	NA	0.011	NA	0.011
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.37	NA	0.37
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.26	NA	0.26
			4-Methylphenol	NA	--	NA	--	4-Methylphenol	ND	NA	1.6	NA	1.6
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.21	NA	0.21
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	1.3	NA	1.3
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	12	NA	12
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.73	NA	0.73
			(Total)	NA	4E-5	NA	4E-5	(Total)		NA	19	NA	19
Groundwater	Groundwater	Groundwater Sitewide	Arsenic	1E-4	NA	2E-7	1E-4	Arsenic	Skin/vascular	2.5	NA	0.0049	2.5
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.56	NA	0.016	0.57
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.025	NA	0.0020	0.027
			Copper	--	NA	--	--	Copper	ND	0.038	NA	0.0075	0.045
			Iron	--	NA	--	--	Iron	ND	4.9	NA	0.010	4.9
			Manganese	--	NA	--	--	Manganese	CNS	3.8	NA	0.19	4.0
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	2.7	NA	0.075	2.7
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.022	NA	0.000043	0.022
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.11	NA	0.00053	0.11
			Thallium	--	NA	--	--	Thallium	Liver enzymes	3.5	NA	0.0069	3.5
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.26	NA	0.020	0.28
			Acetone	--	NA	--	--	Acetone	Kidney	0.0057	NA	0.000016	0.0057
			Benzene	5E-6	NA	2E-7	5E-6	Benzene	Hematopoietic	0.24	NA	0.010	0.25
			Chlorobenzene	--	NA	--	--	Chlorobenzene	Liver	0.039	NA	0.0032	0.042
			Chloroethane	2E-7	NA	2E-9	2E-7	Chloroethane	ND	0.0015	NA	0.000024	0.0015
			1,2-Dichloroethene, isomers	--	NA	--	--	1,2-Dichloroethene, isomers	Serum enzymes	0.040	NA	0.00010	0.040
			1,4-Dichlorobenzene	8E-7	NA	1E-7	9E-7	1,4-Dichlorobenzene	ND	0.013	NA	0.0016	0.014
			4-Methyl-2-pentanone	--	NA	--	--	4-Methyl-2-pentanone	ND	0.0086	NA	0.00000062	0.0086
			4-Methylphenol	--	NA	--	--	4-Methylphenol	ND	0.16	NA	0.0015	0.16
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.13	NA	0.012	0.14
			Xylene	--	NA	--	--	Xylene	Hyperactivity, body wt, mortality	0.018	NA	0.0029	0.021
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.0048	NA	0.00066	0.0054
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.062	NA	0.0084	0.070
			(Total)	1E-4		5E-7	1E-4	(Total)		19		0.37	19
			Total Risk Across All Media and Exposure Routes:				1E-4		Total Risk Across All Media and Exposure Routes:				39

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS HI=	5.5
Total immune HI=	2.7
Total kidney HI=	1.2
Total liver HI=	3.6
Total body weight HI =	0.51
Total blood HI =	1.9
Total cardiovascular HI =	2.5
Total other HI =	19

Table 10.1.Central Tendency
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Current
Receptor Population: Long-term Worker - Developed Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal *	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal *	Exposure Routes Total
Air	Air	Outdoor Air	Mercury vapor	NA	--	NA	--	Mercury vapor	CNS	NA	0.010	NA	0.010
			(Total)	NA	0E+0	NA	0E+0	(Total)			0.010		0.010
Subsurface Soil	Air	Indoor Air (derived from subsurface soil)	Benzene	NA	3E-6	NA	3E-6	Benzene	Hematopoietic	NA	0.13	NA	0.13
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.12	NA	0.12
			(Total)	NA	3E-6	NA	3E-6	(Total)			0.25		0.25
Groundwater	Air	Indoor Air (derived from groundwater)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.000032	NA	0.000032
			Benzene	NA	2E-6	NA	2E-6	Benzene	Hematopoietic	NA	0.00099	NA	0.0010
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.00022	NA	0.00022
			Chloroethane	NA	7E-9	NA	7E-9	Chloroethane	ND	NA	0.0000093	NA	0.0000093
			1,4-Dichlorobenzene	NA	2E-9	NA	2E-9	1,4-Dichlorobenzene	Increased liver weight	NA	0.0000050	NA	0.0000050
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.00038	NA	0.00038
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.000024	NA	0.000024
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.0022	NA	0.0022
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.00097	NA	0.00097
			Naphthalene	NA		NA		Naphthalene	Nasal effects; hyperplasia	NA	0.0016	NA	0.0016
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.00011	NA	0.00011
			(Total)	NA	3E-6	NA	3E-6	(Total)		NA	0.0066	NA	0.0066
Surface Soil	Surface Soil	Developed Area Surface Soil (unpaved)	Aluminum	--	NA	--	--	Aluminum	ND	0.0059	NA	--	0.0059
			Arsenic	8E-7	NA	3E-6	8E-7	Arsenic	Skin/vascular	0.018	NA	0.00071	0.019
			Chromium	--	NA	--	--	Chromium	ND	0.016	NA	--	0.016
			Copper	--	NA	--	--	Copper	ND	0.0057	NA	--	0.0057
			Iron	--	NA	--	--	Iron	ND	0.038	NA	--	0.038
			Manganese	--	NA	--	--	Manganese	CNS	0.0057	NA	--	0.0057
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.51	NA	--	0.51
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0076	NA	--	0.0076
			Benzo[a]pyrene	1E-7	NA	2E-6	2E-7	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	3E-6	NA	4E-9	3E-6	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	2E-6	NA	4E-9	3E-6	Dibenz[a,h]anthracene	ND	--	NA	--	--
			(Total)	9E-7		6E-6	1E-6	(Total)		0.60		0.00071	0.60
			Total Risk Across All Media and Exposure Routes:				4E-6			Total Hazard Index Across All Media and Exposure Routes:			0.87

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
* Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.019
Total immune HI=	0.51
Total liver HI=	0.0000050
Total cardiovascular HI=	0.019
Total blood HI=	0.14
Total body/organ weight HI=	0.0000050
Total other HI=	0.19

Table 10.2.Central Tendency
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Receptor Population: Long-term Worker - Developed Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Air	Air	Outdoor Air	Mercury vapor	NA	--	NA	--	Mercury vapor	CNS	NA	0.010	NA	0.010
			(Total)	NA	0E+0	NA	0E+0	(Total)			0.010		0.010
Subsurface Soil	Air	Indoor Air (derived from subsurface soil)	Benzene	NA	3E-6	NA	3E-6	Benzene	Hematopoietic	NA	0.13	NA	0.13
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.12	NA	0.12
			(Total)	NA	3E-6	NA	3E-6	(Total)			0.25		0.25
Groundwater	Air	Indoor Air (derived from groundwater)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.000032	NA	0.000032
			Benzene	NA	2E-8	NA	2E-8	Benzene	Hematopoietic	NA	0.00099	NA	0.0010
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.00022	NA	0.00022
			Chloroethane	NA	7E-9	NA	7E-9	Chloroethane	ND	NA	0.0000093	NA	0.0000093
			1,4-Dichlorobenzene	NA	2E-9	NA	2E-9	1,4-Dichlorobenzene	Increased liver weight	NA	0.0000050	NA	0.0000050
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.00038	NA	0.00038
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.000024	NA	0.000024
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.0022	NA	0.0022
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.00097	NA	0.00097
			Naphthalene	NA		NA		Naphthalene	Nasal effects; hyperplasia	NA	0.0016	NA	0.0016
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.00011	NA	0.00011
			(Total)	NA	3E-8	NA	3E-8	(Total)		NA	0.0066	NA	0.0066
Surface Soil	Surface Soil	Developed Area Surface Soil (all)	Aluminum	--	NA	--	--	Aluminum	ND	0.0059	NA	--	0.0059
			Arsenic	8E-7	NA	3E-8	8E-7	Arsenic	Skin/vascular	0.018	NA	0.00071	0.019
			Chromium	--	NA	--	--	Chromium	ND	0.012	NA	--	0.012
			Copper	--	NA	--	--	Copper	ND	0.0084	NA	--	0.0084
			Iron	--	NA	--	--	Iron	ND	0.035	NA	--	0.035
			Manganese	--	NA	--	--	Manganese	CNS	0.0042	NA	--	0.0042
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	3.7	NA	--	3.7
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.015	NA	--	0.015
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0076	NA	--	0.0076
			Benzene	7.E-10	NA	--	7E-10	Benzene	Hematopoietic	0.000035	NA		0.000035
			Benz[a]anthracene	3.E-8	NA	5E-9	3E-8	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	2.E-7	NA	4E-8	3E-7	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	4.E-8	NA	6E-9	4E-8	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	5.E-8	NA	9E-9	6E-8	Dibenz[a,h]anthracene	ND	--	NA	--	--
			(Total)	1E-6		9E-8	1E-6	(Total)		3.8		0.00071	3.8

Table 10.2.Central Tendency (continued)
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Receptor Population: Long-term Worker - Developed Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Groundwater	Groundwater	Groundwater Sitewide	Arsenic	4E-6	NA	3E-10	4E-6	Arsenic	Skin/vascular	0.065	NA	0.000010	0.065
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.015	NA	0.000031	0.015
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00065	NA	0.0000039	0.00066
			Copper	--	NA	--	--	Copper	ND	0.0010	NA	0.000015	0.0010
			Iron	--	NA	--	--	Iron	ND	0.13	NA	0.000019	0.13
			Manganese	--	NA	--	--	Manganese	CNS	0.10	NA	0.00038	0.10
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.069	NA	0.00015	0.070
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00057	NA	0.000000085	0.00057
			Nickel	--	NA	--	--	Nickel	Decreased body/organ weights	0.0028	NA	0.0000011	0.0028
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.091	NA	0.000014	0.091
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0069	NA	0.000040	0.0069
			Acetone	--	NA	--	--	Acetone	Kidney	0.00015	NA	0.000000031	0.00015
			Benzene	2E-7	NA	3E-10	2E-7	Benzene	Hematopoietic	0.0064	NA	0.000020	0.0064
			Chlorobenzene	--	NA	--	--	Chlorobenzene	Liver	0.0010	NA	0.0000063	0.0010
			Chloroethane	--	NA	--	--	Chloroethane	ND	0.000040	NA	0.000000048	0.000040
			1,2-Dichloroethene, isomers	6E-9	NA	4E-12	6E-9	1,2-Dichloroethene, isomers	Serum enzymes	0.0010	NA	0.00000020	0.0010
			1,4-Dichlorobenzene	--	NA	--	--	1,4-Dichlorobenzene	ND	0.00033	NA	0.0000031	0.00034
			4-Methyl-2-pentanone	3E-8	NA	1E-10	3E-8	4-Methyl-2-pentanone	ND	0.00023	NA	0.0000000012	0.00023
			4-Methylphenol	--	NA	--	--	4-Methylphenol	ND	0.0047	NA	0.0000031	0.0047
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.0034	NA	0.000023	0.0034
			Xylene	--	NA	--	--	Xylene	Hyperactivity, body wt, mortality	0.00047	NA	0.0000057	0.00047
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.00013	NA	0.0000013	0.00013
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.0016	NA	0.000017	0.0016
			(Total)	4E-6		7E-10	4E-6	(Total)		0.50		0.00074	0.50
			Total Risk Across All Media and Exposure Routes:				8E-6		Total Hazard Index Across All Media and Exposure Routes:				4.5

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.12
Total immune HI=	3.7
Total kidney HI=	0.019
Total liver HI=	0.11
Total cardiovascular HI=	0.084
Total blood HI=	0.15
Total body/organ weight HI=	0.0080
Total other HI=	0.33

Table 10.3.Central Tendency
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Receptor Population: Long-term Worker - Undeveloped Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Air	Air	Outdoor Air	Mercury vapor	NA	--	NA	--	Mercury vapor	CNS	NA	0.010	NA	0.010
			(Total)		0E+0		0E+0	(Total)			0.010		0.010
Subsurface Soil	Air	Indoor Air (derived from subsurface soil)	Carbazole	NA	1E-11	NA	1E-11	Carbazole	ND	NA	--	NA	--
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.020	NA	0.020
			Xylenes	NA	--	NA		Xylenes	CNS	NA	0.12	NA	0.12
			Benz[a]anthracene	NA	9E-9	NA	9E-9	Benz[a]anthracene	ND	NA	--	NA	--
			Benzo[a]pyrene	NA	7E-8	NA	7E-8	Benzo[a]pyrene	ND	NA	--	NA	--
			Benzo[b]fluoranthene	NA	9E-9	NA	9E-9	Benzo[b]fluoranthene	ND	NA	--	NA	--
			Benzo[ghi]perylene	NA	--	NA	--	Benzo[ghi]perylene	ND	NA	0.000053	NA	0.000053
			Benzo[k]fluoranthene	NA	3E-10	NA	3E-10	Benzo[k]fluoranthene	ND	NA	--	NA	--
			Dibenz[a,h]anthracene	NA	1E-8	NA	1E-8	Dibenz[a,h]anthracene	ND	NA	--	NA	--
			Indeno[1,2,3-cd]pyrene	NA	3E-9	NA	3E-9	Indeno[1,2,3-cd]pyrene	ND	NA	--	NA	--
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.12	NA	0.12
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	0.31	NA	0.31
			(Total)	NA	1E-7	NA	1E-7	(Total)		NA	0.57	NA	0.57
Groundwater	Air	Indoor Air (derived from groundwater)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.000032	NA	0.000032
			Benzene	NA	2E-8	NA	2E-8	Benzene	Hematopoietic	NA	0.00099	NA	0.0010
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.00022	NA	0.00022
			Chloroethane	NA	7E-9	NA	7E-9	Chloroethane	ND	NA	0.0000093	NA	0.0000093
			1,4-Dichlorobenzene	NA	2E-9	NA	2E-9	1,4-Dichlorobenzene	Increased liver weight	NA	0.0000050	NA	0.0000050
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.00038	NA	0.00038
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.000024	NA	0.000024
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.0022	NA	0.0022
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.00097	NA	0.00097
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	0.0016	NA	0.0016
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.00011	NA	0.00011
			(Total)	NA	3E-8	NA	3E-8	(Total)		NA	0.0068	NA	0.0068
Surface Soil	Surface Soil	Undeveloped Area Surface Soil	Aluminum	--	NA	--	--	Aluminum	ND	0.0030	NA	--	0.0030
			Antimony	--	NA	--	--	Antimony	Longevity; metabolic	0.016	NA	--	0.016
			Arsenic	7E-7	NA	3E-8	7E-7	Arsenic	Skin/vascular	0.016	NA	0.00082	0.016
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.011	NA	--	0.011
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00073	NA	0.000019	0.00075
			Chromium	--	NA	--	--	Chromium	ND	0.064	NA	--	0.064
			Copper	--	NA	--	--	Copper	ND	0.0072	NA	--	0.0072
			Iron	--	NA	--	--	Iron	ND	0.056	NA	--	0.056
			Manganese	--	NA	--	--	Manganese	CNS	0.0071	NA	--	0.0071
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.83	NA	--	0.83
			Methylmercury	--	NA	--		Methylmercury	Neurologic	0.0016	NA	--	0.0016
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.0013	NA	--	0.0013
			Silver	--	NA	--	--	Silver	Skin (argyria)	0.0022	NA	--	0.0022
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.026	NA	--	0.026
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0040	NA	--	0.0040
			Zinc	--	NA	--	--	Zinc	Blood	0.030	NA	--	0.030
			Bis[2-ethylhexyl]phthalate	3E-8	NA	4E-9	4E-8	Bis[2-ethylhexyl]phthalate	Increased liver weight	0.0012	NA	0.00016	0.0013
			Benz[a]anthracene	8E-8	NA	0E+0	8E-8	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	1E-6	NA	1E-8	1E-6	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	1E-7	NA	2E-7	3E-7	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	3E-7	NA	2E-8	3E-7	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	6E-8	NA	5E-8	1E-7	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			Naphthalene	--	NA	1E-8	1E-8	Naphthalene	Body weight	0.00012	NA	0.000021	0.00015
			2-Methylnaphthalene	--		--	--	2-Methylnaphthalene	Body weight	0.000060	NA	0.000010	0.000071
			PCBs	4E-7	NA	8E-8	5E-7	PCBs	Immunologic	0.11	NA	0.020	0.13
			(Total)	3E-6		4E-7	3E-6	(Total)		1.2		0.021	1.2

Table 10.3.Central Tendency (continued)
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Future
Receptor Population: Long-term Worker - Undeveloped Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Groundwater	Groundwater	Groundwater Sitewide	Arsenic	4E-6	NA	3E-10	4E-6	Arsenic	Skin/vascular	0.065	NA	0.000010	0.065
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.015	NA	0.000031	0.015
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00065	NA	0.0000039	0.00066
			Copper	--	NA	--	--	Copper	ND	0.0010	NA	0.000015	0.0010
			Iron	--	NA	--	--	Iron	ND	0.13	NA	0.000019	0.13
			Manganese	--	NA	--	--	Manganese	CNS	0.10	NA	0.00038	0.10
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.069	NA	0.00015	0.070
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00057	NA	0.000000085	0.00057
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.0028	NA	0.0000011	0.0028
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.091	NA	0.000014	0.091
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0069	NA	0.000040	0.0069
			Acetone	--	NA	--	--	Acetone	Kidney	0.00015	NA	0.000000031	0.00015
			Benzene	2E-7	NA	3E-10	2E-7	Benzene	Hematopoietic	0.0064	NA	0.000020	0.0064
			Chlorobenzene	--	NA	--	--	Chlorobenzene	Liver	0.0010	NA	0.0000063	0.0010
			Chloroethane	--	NA	--	--	Chloroethane	ND	0.000040	NA	0.000000048	0.000040
			1,2-Dichloroethene, isomers	6E-9	NA	4E-12	6E-9	1,2-Dichloroethene, isomers	Serum enzymes	0.0010	NA	0.00000020	0.0010
			1,4-Dichlorobenzene	--	NA	--	--	1,4-Dichlorobenzene	ND	0.00033	NA	0.0000031	0.00034
			4-Methyl-2-pentanone	3E-8	NA	1E-10	3E-8	4-Methyl-2-pentanone	ND	0.00023	NA	0.0000000012	0.00023
			4-Methylphenol	--	NA	--	--	4-Methylphenol	ND	0.0047	NA	0.0000031	0.0047
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.0034	NA	0.000023	0.0034
			Xylene	--	NA	--	--	Xylene	Hyperactivity, body wt, mortality	0.00047	NA	0.0000057	0.00047
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.00013	NA	0.0000013	0.00013
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.0016	NA	0.000017	0.0016
			(Total)	4E-6		7E-10	4E-6	(Total)		0.50		0.00074	0.50
			Total Risk Across All Media and Exposure Routes:				7E-6		Total Hazard Index Across All Media and Exposure Routes:				2.3

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
PCBs - Polychlorinated biphenyls
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.27
Total immune HI=	1.0
Total kidney HI=	0.027
Total liver HI=	0.12
Total cardiovascular HI=	0.082
Total skin HI=	0.0022
Total metabolic HI =	0.016
Total blood HI=	0.048
Total body/organ weight HI=	0.011
Total other HI=	0.69

Table 10.4.Central Tendency
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor - Undeveloped Area
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Surface Soil	Surface Soil	Undeveloped Area Surface Soil	Aluminum	--	NA	--	--	Aluminum	ND	0.00078	NA	--	0.00078
			Antimony	--	NA	--	--	Antimony	Longevity; metabolic	0.0040	NA	--	0.0040
			Arsenic	2E-7	NA	8E-9	2E-7	Arsenic	Skin/vascular	0.0041	NA	0.00014	0.0042
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.0028	NA	--	0.0028
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00019	NA	0.0000043	0.00019
			Chromium	--	NA	--	--	Chromium	ND	0.017	NA	--	0.017
			Copper	--	NA	--	--	Copper	ND	0.0019	NA	--	0.0019
			Iron	--	NA	--	--	Iron	ND	0.015	NA	--	0.015
			Manganese	--	NA	--	--	Manganese	CNS	0.0019	NA	--	0.0019
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.22	NA	--	0.22
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00041	NA	--	0.00041
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.00033	NA	--	0.00033
			Silver	--	NA	--	--	Silver	Skin (argyria)	0.00056	NA	--	0.00056
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.0067	NA	--	0.0067
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0010	NA	--	0.0010
			Zinc	--	NA	--	--	Zinc	Blood	0.0078	NA	--	0.0078
			Bis[2-ethylhexyl]phthalate	1E-8	NA	1E-9	1E-8	Bis[2-ethylhexyl]phthalate	Increased liver weight	0.00031	NA	0.000035	0.00034
			Benz[a]anthracene	3E-8	NA	4E-9	3E-8	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	3E-7	NA	5E-8	4E-7	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	4E-8	NA	6E-9	4E-8	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	1E-7	NA	2E-8	1E-7	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	2E-8	NA	3E-9	2E-8	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			Napthalene	--		--		Napthalene	Body weight	0.000032		0.0000048	0.000037
			2-Methlynapthalene	--	NA	--	--	2-Methlynapthalene	Body weight	0.000016	NA	0.0000023	0.000018
			PCBs	1E-7	NA	2E-8	2E-7	PCBs	Immunologic	0.028	NA	0.0045	0.032
			(Total)	9E-7		1E-7	1E-6	(Total)		0.31		0.0047	0.31
Sediment	Sediment	Undeveloped Area Surface Sediment	Aluminum	--	NA	--	--	Aluminum	ND	0.0018	NA	--	0.0018
			Arsenic	2E-7	NA	7E-9	2E-7	Arsenic	Skin/vascular	0.0037	NA	0.00013	0.0039
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00012	NA	0.0000026	0.00012
			Chromium	--	NA	--	--	Chromium	ND	0.0066	NA	--	0.0066
			Iron	--	NA	--	--	Iron	ND	0.0091	NA	--	0.0091
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.55	NA	--	0.55
			Methylmercury	--		--	--	Methylmercury	Neurologic	0.00016	NA	--	0.00016
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.0076	NA	--	0.0076
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0010	NA	--	0.0010
			Zinc	--	NA	--	--	Zinc	Blood	0.0015	NA	--	0.0015
			Benz[a]anthracene	2E-8	NA	3E-9	2E-8	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	2E-7	NA	3E-8	2E-7	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	2E-8	NA	3E-9	2E-8	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	4E-8	NA	6E-9	4E-8	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	1E-8	NA	2E-9	2E-8	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			PCBs	2E-8	NA	4E-9	3E-8	PCBs	Immunologic	0.0046	NA	0.00074	0.0054
			(Total)	5E-7		5E-8	6E-7	(Total)		0.58		0.00087	0.58
Surface Water	Surface Water	Undeveloped Area Surface Water	Iron	--	NA	--	--	Iron	ND	0.00013	NA	0.000063	0.00020
			Manganese	--	NA	--	--	Manganese	CNS	0.00014	NA	0.0016	0.0017
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.00090	NA	0.0061	0.0070
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00000042	NA	0.00000020	0.00000062
			(Total)	0E+0		0E+0	0E+0	(Total)		0.0012		0.0077	0.0089
			Total Risk Across All Media and Exposure Routes:				2E-6		Total Hazard Index Across All Media and Exposure Routes:				0.90

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
PCBs - Polychlorinated biphenyls
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS and neurological HI=	0.0042
Total immune HI=	0.81
Total kidney HI=	0.0031
Total liver HI=	0.014
Total skin HI=	0.00056
Total cardiovascular HI=	0.0031
Total metabolic HI=	0.0040
Total blood HI=	0.011
Total body/organ weight HI=	0.00072
Total other HI=	0.052

Table 10.5.Central Tendency
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor - Undeveloped Area
Receptor Age: Adolescent/Pre-Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Surface Soil	Surface Soil	Undeveloped Area Surface Soil	Aluminum	--	NA	--	--	Aluminum	ND	0.0011	NA	--	0.0011
			Antimony	--	NA	--	--	Antimony	Longevity; metabolic	0.0058	NA	--	0.0058
			Arsenic	3E-7	NA	3E-8	4E-7	Arsenic	Skin/vascular	0.0058	NA	0.00056	0.0064
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.0040	NA	--	0.0040
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00027	NA	0.000017	0.00029
			Chromium	--	NA	--	--	Chromium	ND	0.024	NA	--	0.024
			Copper	--	NA	--	--	Copper	ND	0.0027	NA	--	0.0027
			Iron	--	NA	--	--	Iron	ND	0.021	NA	--	0.021
			Manganese	--	NA	--	--	Manganese	CNS	0.0026	NA	--	0.0026
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.31	NA	--	0.31
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00059	NA	--	0.00059
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.00046	NA	--	0.00046
			Silver	--	NA	--	--	Silver	Skin (argyria)	0.00080	NA	--	0.00080
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.010	NA	--	0.010
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0015	NA	--	0.0015
			Zinc	--	NA	--	--	Zinc	Blood	0.011	NA	--	0.011
			Bis[2-ethylhexyl]phthalate	2E-8	NA	5E-9	2E-8	Bis[2-ethylhexyl]phthalate	Increased liver weight	0.00044	NA	0.00014	0.00058
			Benz[a]anthracene	4E-8	NA	2E-8	6E-8	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	5E-7	NA	2E-7	7E-7	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	5E-8	NA	2E-8	8E-8	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	2E-7	NA	6E-8	2E-7	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	3E-8	NA	1E-8	4E-8	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			Napthalene	--	NA	--	--	Napthalene	Body weight	0.000046	NA	0.00020	0.00024
			2-Methlynapthalene	--	NA	--	--	2-Methlynapthalene	Body weight	0.000022		0.000095	0.00012
			PCBs	2E-7	NA	9E-8	3E-7	PCBs	Immunologic	0.040	NA	0.018	0.058
			(Total)	1E-6		4E-7	2E-6	(Total)		0.44		0.019	0.46
Sediment	Sediment	Undeveloped Area Surface Sediment	Aluminum	--	NA	--	--	Aluminum	ND	0.0025	NA	--	0.0025
			Arsenic	3E-7	NA	3E-8	3E-7	Arsenic	Skin/vascular	0.0053	NA	0.00051	0.0058
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.00017	NA	0.000011	0.00018
			Chromium	--	NA	--	--	Chromium	ND	0.0094	NA	--	0.0094
			Iron	--	NA	--	--	Iron	ND	0.013	NA	--	0.013
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.78	NA	--	0.78
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00023	NA	--	0.00023
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.011	NA	--	0.011
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.0014	NA	--	0.0014
			Zinc	--	NA	--	--	Zinc	Blood	0.0021	NA	--	0.0021
			Benz[a]anthracene	3E-8	NA	1E-8	4E-8	Benz[a]anthracene	ND	--	NA	--	--
			Benzo[a]pyrene	3E-7	NA	1E-7	4E-7	Benzo[a]pyrene	ND	--	NA	--	--
			Benzo[b]fluoranthene	3E-8	NA	1E-8	4E-8	Benzo[b]fluoranthene	ND	--	NA	--	--
			Dibenz[a,h]anthracene	5E-8	NA	2E-8	8E-8	Dibenz[a,h]anthracene	ND	--	NA	--	--
			Indeno[1,2,3-cd]pyrene	2E-8	NA	9E-9	3E-8	Indeno[1,2,3-cd]pyrene	ND	--	NA	--	--
			PCBs	3E-8	NA	2E-8	5E-8	PCBs	Immunologic	0.0066	NA	0.0030	0.010
			(Total)	8E-7		2E-7	1E-6	(Total)		0.83		0.0035	0.84
Surface Water	Surface Water	Undeveloped Area Surface Water	Iron	--	NA	--	--	Iron	ND	0.00019	NA	0.000063	0.00025
			Manganese	--	NA	--	--	Manganese	CNS	0.00019	NA	0.0016	0.0018
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.0013	NA	0.0061	0.0074
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00000060	NA	0.00000020	0.00000081
			(Total)	0E+0		0E+0	0E+0	(Total)		0.0017		0.0076	0.0094
			Total Risk Across All Media and Exposure Routes:				3E-6		Total Hazard Index Across All Media and Exposure Routes:				1.3

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
PCBs - Polychlorinated biphenyls
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total body/organ weight HI=	0.0010
Total other HI=	0.074

Total CNS HI=	0.0053
Total immune HI=	1.2
Total kidney HI=	0.0044
Total liver HI=	0.020
Total skin HI=	0.00080
Total cardiovascular HI=	0.012
Total metabolic HI=	0.0058
Total blood HI=	0.016

Table 10.6.Central Tendency
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Future Hypothetical
Receptor Population: Resident - domestic use of groundwater
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal *	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal *	Exposure Routes Total
Groundwater	Air	Indoor Air (showering/ bathing)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.088	NA	0.088
			Benzene	NA	6E-6	NA	6E-6	Benzene	Hematopoietic	NA	0.19	NA	0.19
			Bis[2-ethylhexyl]phthalate	NA	9E-7	NA	9E-7	Bis[2-ethylhexyl]phthalate	Increased liver weight	NA	0.024	NA	0.024
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.033	NA	0.033
			Chloroethane	NA	3E-7	NA	3E-7	Chloroethane	ND	NA	0.00024	NA	0.00024
			1,4-Dichlorobenzene	NA	1E-6	NA	1E-6	1,4-Dichlorobenzene	Increased liver weight	NA	0.0015	NA	0.0015
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.053	NA	0.053
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.036	NA	0.036
			4-Methylphenol	NA	--	NA	--	4-Methylphenol	ND	NA	0.23	NA	0.23
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.030	NA	0.030
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.18	NA	0.18
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	1.7	NA	1.7
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.10	NA	0.10
			(Total)	NA	6E-6	NA	6E-6	(Total)		NA	2.7	NA	2.7
Groundwater	Groundwater	Groundwater Sitewide	Arsenic	3E-5	NA	4E-6	3E-5	Arsenic	Skin/vascular	0.50	NA	0.00064	0.50
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.11	NA	0.0021	0.11
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.0050	NA	0.00026	0.0052
			Copper	--	NA	--	--	Copper	ND	0.0076	NA	0.0010	0.0085
			Iron	--	NA	--	--	Iron	ND	0.98	NA	0.0013	1.0
			Manganese	--	NA	--	--	Manganese	CNS	0.77	NA	0.025	0.79
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.53	NA	0.0097	0.54
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.0043	NA	0.0000055	0.0043
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.021	NA	0.000069	0.022
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.70	NA	0.00089	0.70
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.053	NA	0.0026	0.055
			Acetone	--	NA	--	--	Acetone	Kidney	0.0011	NA	0.0000021	0.0011
			Benzene	1E-6	NA	4E-8	1E-6	Benzene	Hematopoietic	0.049	NA	0.0013	0.050
			Chlorobenzene	--	NA	--	--	Chlorobenzene	Liver	0.0078	NA	0.00041	0.0082
			Chloroethane	5E-8	NA	5E-10	5E-8	Chloroethane	ND	0.00030	NA	0.0000031	0.00031
			1,2-Dichloroethene, isomers	--	NA	--	--	1,2-Dichloroethene, isomers	Serum enzymes	0.0080	NA	0.000013	0.0080
			1,4-Dichlorobenzene	2E-7	NA	2E-8	3E-7	1,4-Dichlorobenzene	ND	0.0026	NA	0.00020	0.0028
			4-Methyl-2-pentanone	--	NA	--	--	4-Methyl-2-pentanone	ND	0.0017	NA	0.000000080	0.0017
			4-Methylphenol	--	NA	--	--	4-Methylphenol	ND	0.036	NA	0.00020	0.036
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.026	NA	0.0015	0.027
			Xylene	--	NA	--	--	Xylene	Hyperactivity, body wt, mortality	0.0036	NA	0.00037	0.0039
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.0010	NA	0.000085	0.0010
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.012	NA	0.0011	0.013
			(Total)	3E-5		9E-8	3E-5	(Total)		3.8		0.048	3.9
			Total Risk Across All Media and Exposure Routes:				4E-5		Total Risk Across All Media and Exposure Routes:				6.6

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
* Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS HI=	1.0
Total immune HI=	0.54
Total kidney HI=	0.21
Total liver HI=	0.71
Total body weight HI =	0.089
Total blood HI =	0.30
Total cardiovascular HI =	0.50
Total other HI =	3.0

Table 10.7.Central Tendency
Summary of Receptor Risks and Hazards for COPCs

Ventron/Velsicol Site OU1

Scenario Timeframe: Future Hypothetical
Receptor Population: Resident - domestic use of groundwater
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal [a]	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal [a]	Exposure Routes Total
Groundwater	Air	Indoor Air (showering/ bathing)	Acetone	NA	--	NA	--	Acetone	Kidney	NA	0.21	NA	0.21
			Benzene	NA	9E-6	NA	9E-6	Benzene	Hematopoietic	NA	0.46	NA	0.46
			Bis[2-ethylhexyl]phthalate	NA	1E-6	NA	1E-6	Bis[2-ethylhexyl]phthalate	Increased liver weight	NA	0.056	NA	0.056
			Chlorobenzene	NA	--	NA	--	Chlorobenzene	ND	NA	0.077	NA	0.077
			Chloroethane	NA	4E-7	NA	4E-7	Chloroethane	ND	NA	0.00056	NA	0.00056
			1,4-Dichlorobenzene	NA	2E-6	NA	2E-6	1,4-Dichlorobenzene	Increased liver weight	NA	0.0036	NA	0.0036
			1,2-Dichloroethene, isomers	NA	--	NA	--	1,2-Dichloroethene, isomers	Serum enzymes	NA	0.12	NA	0.12
			4-Methyl-2-pentanone	NA	--	NA	--	4-Methyl-2-pentanone	ND	NA	0.085	NA	0.085
			4-Methylphenol	NA	--	NA	--	4-Methylphenol	ND	NA	0.53	NA	0.53
			Toluene	NA	--	NA	--	Toluene	Neurological effects	NA	0.070	NA	0.070
			Xylenes	NA	--	NA	--	Xylenes	CNS	NA	0.42	NA	0.42
			Naphthalene	NA	--	NA	--	Naphthalene	Nasal effects; hyperplasia	NA	4.1	NA	4.1
			2-Methylnaphthalene	NA	--	NA	--	2-Methylnaphthalene	Nasal effects; hyperplasia	NA	0.24	NA	0.24
			(Total)	NA	1E-5	NA	1E-5	(Total)		NA	6.3	NA	6.3
Groundwater	Groundwater	Groundwater Sitewide	Arsenic	5E-5	NA	6E-6	5E-5	Arsenic	Skin/vascular	0.11	NA	0.0015	0.11
			Barium	--	NA	--	--	Barium	None reported (kidney)	0.024	NA	0.0049	0.029
			Cadmium	--	NA	--	--	Cadmium	Kidney	0.0011	NA	0.00061	0.0017
			Copper	--	NA	--	--	Copper	ND	0.0016	NA	0.0023	0.0039
			Iron	--	NA	--	--	Iron	ND	0.21	NA	0.0030	0.21
			Manganese	--	NA	--	--	Manganese	CNS	0.16	NA	0.059	0.22
			Mercury (total)	--	NA	--	--	Mercury (total)	Immunologic	0.11	NA	0.023	0.14
			Methylmercury	--	NA	--	--	Methylmercury	Neurologic	0.00091	NA	0.000013	0.00093
			Nickel	--	NA	--	--	Nickel	Decreased body and organ weights	0.0045	NA	0.00017	0.0047
			Thallium	--	NA	--	--	Thallium	Liver enzymes	0.15	NA	0.0021	0.15
			Vanadium	--	NA	--	--	Vanadium	Hematopoietic	0.011	NA	0.0062	0.017
			Acetone	--	NA	--	--	Acetone	Kidney	0.00024	NA	0.0000049	0.00025
			Benzene	2E-6	NA	6E-8	2E-6	Benzene	Hematopoietic	0.010	NA	0.0032	0.014
			Chlorobenzene	--	NA	--	--	Chlorobenzene	Liver	0.0016	NA	0.00098	0.0026
			Chloroethane	7E-8	NA	7E-10	7E-8	Chloroethane	ND	0.000064	NA	0.0000074	0.000071
			1,2-Dichloroethene, isomers	--	NA	--	--	1,2-Dichloroethene, isomers	Serum enzymes	0.0017	NA	0.000032	0.0017
			1,4-Dichlorobenzene	4E-7	NA	3E-8	4E-7	1,4-Dichlorobenzene	ND	0.00054	NA	0.00049	0.0010
			4-Methyl-2-pentanone	--	NA	--	--	4-Methyl-2-pentanone	ND	0.00038	NA	0.00000019	0.00037
			4-Methylphenol	--	NA	--	--	4-Methylphenol	ND	0.0078	NA	0.00046	0.0081
			Toluene	--	NA	--	--	Toluene	Liver and kidney weight	0.0055	NA	0.0036	0.0091
			Xylene	--	NA	--	--	Xylene	Hyperactivity, body wt, mortality	0.00075	NA	0.00089	0.0016
			2-Methylnaphthalene	--	NA	--	--	2-Methylnaphthalene	Body weight	0.00020	NA	0.00020	0.00041
			Naphthalene	--	NA	--	--	Naphthalene	Body weight	0.0026	NA	0.0026	0.0052
			(Total)	5E-5		1E-7	5E-5	(Total)		0.81		0.12	0.92
			Total Risk Across All Media and Exposure Routes:				6E-5		Total Risk Across All Media and Exposure Routes:				7.3

Notes:
NA - not applicable
ND - no data available in EPA sources regarding toxicity endpoint
CNS - central nervous system
[a] Consistent with EPA guidance, dermal pathway was analyzed where absorption data were available (U.S. EPA 2001). See text.

Total CNS HI=	0.71
Total immune HI=	0.14
Total kidney HI=	0.24
Total liver HI=	0.15
Total body weight HI =	0.079
Total blood HI =	0.49
Total cardiovascular HI =	0.11
Total other HI =	4.8

Appendix B

Region IX Tables of Screening Values

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

October 1, 2002

Subject: Region 9 PRGs Table 2002 Update

From: Stanford J. Smucker, Ph.D.
Regional Toxicologist (SFD-8-B)
Technical Support Team

To: PRGs Table Users

With this cover letter, we announce the update to the Region 9 PRGs table for 2002. The PRGs table contains over 600 preliminary remediation goals (PRGs) for contaminants in soil, air, and tap water. Region 9 PRGs are risk-based concentrations that are intended to assist risk assessors and others in initial screening-level evaluations of environmental measurements.

As their name implies, Region 9 PRGs may also be viewed as preliminary cleanup goals for an individual chemical, but in this context, they are best viewed as dynamic and subject to change because they are generic and based on direct contact exposures which may not address site-specific conditions and/or indirect exposure pathways at sites (See Exhibit 1-1 in "Region 9 PRGs Table Users Guide/Technical Background Document"). Also for planning purposes, these human health based PRGs should always be considered in conjunction with ARAR-based PRGs (e.g. MCLs), ecological benchmarks, and "background" conditions before establishing a final cleanup level for a particular site.

You can find the PRGs 2002 table, InterCalc tables, "Region 9 PRGs Table Users Guide/Technical Background Document", and additional helpful toxicological and risk assessment information at:

http://www.epa.gov/region09/waste/sfund/prg/ .

We view risk-based PRGs as "evergreen". Ongoing changes to the PRGs reflect continuing improvements in our scientific knowledge base and state-of-the-art approaches to risk assessment. In the new *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (Supplemental SSL Guidance, EPA 2001a), two different soil ingestion rates are assumed for non-construction workers: 100 mg/day is assumed for outdoor workers whereas 50 mg/day is assumed for indoor workers. The default value of 100 mg/day for outdoor workers is also recommended by EPA's Technical Review Workgroup for Lead (TRW), and it reflects increased exposures to soils for outdoor workers relative to their indoor counterparts. For more on this, please see Section 4.1 of the "Region 9 PRGs Table Users Guide/Technical Background Document" or refer to the Supplemental SSL Guidance available at the following website:

http://www.epa.gov/superfund/resources/soil/index.htm

Because the Region 9 PRGs are generic and intended for screening sites early in the investigation process (often before site-specific information is available), we have chosen to use the 100 mg/day soil ingestion (i.e. outdoor worker) assumption to calculate industrial soil PRGs. Please note that previous issues of the Region 9 PRGs table assumed 50 mg/day soil ingestion rate for workers. This change in soil ingestion rates is reflected in a somewhat lower (more stringent) industrial soils PRG for many contaminants. The appropriateness of this assumption for a particular site may be evaluated when additional information becomes available regarding site conditions or site development.

In addition to changes in exposure factor assumptions, several chemicals have new or revised toxicity values that results in changes to the PRG calculations. To facilitate the users review, chemicals with new and revised toxicological criteria are presented in bold in the 2002 table and also listed here for convenience: **acetonitrile, benzyl chloride, boron, bromate, 1,3-butadiene, 1-butanol, butylbenzenes, cacodylic acid, cadmium (California State value), chloroform, chloronitrobenzenes, chrysene (California State value), cobalt, 1,2-dibromo-3-chloropropane (California State value), 1,1-dichloroethylene, diethylene glycol ethers, diethylformamide, dinitrobenzenes, di-n-octyl phthalate, diphenyl sulfone, ethylbenzene, HCH, hexachlorocyclopentadiene, kepone, lead (California State value), MTBE, 2-nitroaniline, carcinogenic PAHs, perchlorate, polychlorinated terphenyls, benzo(k)fluoranthene (California State value), propylbenzene, propylene glycol, quinoline, tetrachloroethylene, tetrahydrofuran, thiocyanate, 1,1,1-trichloroethane, trichloroethylene, 2,4,6-trichlorophenol, 1,2,3-trichloropropane, triphenylphosphine oxide, tris(2-chloroethyl) phosphate, vinyl chloride, and xylene.**

Also in this update to the "Region 9 PRGs Table User's Guide/Technical Background Document", we have added a brief discussion of special case chemicals for which an alternate approach was applied in the derivation of the Region 9 PRGs (Section 2.3). Increasingly, chemical-specific approaches are being used that do not lend themselves to a single PRG model. Special case chemicals that are discussed include: cadmium, chromium 6, lead, manganese, nitrate/nitrite, thallium, and vinyl chloride.

Finally it should be recognized by all that use the PRGs table that not all PRG values in the table are "created equal". For some chemicals, a robust data set exists upon which the toxicological criteria are based whereas for others, there may be relatively few studies that form the basis of the PRG calculation. Also, PRGs for some chemicals are based on withdrawn toxicity values or route-extrapolated values. Withdrawn and route-extrapolated numbers are shown in the table because we still need to deal with these contaminants during the long delays before replacement numbers are ready. Please consult with your toxicologist or agency risk assessor to best address potential uncertainties associated with chemical-specific PRGs, especially if the chemical is a risk driver at your site.

As with any risk-based tool, there exists the potential for misuse. We try to highlight potential problems in Section 3.8. However, it should be noted that the use of PRGs at a particular site becomes the responsibility of the user. It is recommended that the user verify the numbers with an agency toxicologist or risk assessor because the toxicity / exposure information in the table may contain errors or default assumptions that need to be refined based on further evaluation. If you find an error please send me a note via email at smucker.stan@epa.gov.

DISCLAIMER

Preliminary remediation goals (PRGs) focus on common exposure pathways and may not consider all exposure pathways encountered at CERCLA / RCRA sites (Exhibit 1-1). PRGs do not consider impact to groundwater or address ecological concerns. The PRG table is specifically not intended as a (1) stand-alone decision-making tool, (2) as a substitute for EPA guidance for preparing baseline risk assessments, (3) a rule to determine if a waste is hazardous under RCRA, or (4) set of final cleanup or action levels to be applied at contaminated sites.

The guidance set out in this document is not final Agency action. It is not intended, nor can it be relied upon to create any rights enforceable by any party in litigation with the United States. EPA officials may decide to follow the guidance provided herein, or act at variance with the guidance, based on an analysis of specific circumstances. The Agency also reserves the right to change this guidance at any time without public notice.

1.0 INTRODUCTION

Region 9 Preliminary Remediation Goals (PRGs) are risk-based tools for evaluating and cleaning up contaminated sites. They are being used to streamline and standardize all stages of the risk decision-making process.

The Region 9 PRG table combines current EPA toxicity values with "standard" exposure factors to estimate contaminant concentrations in environmental media (soil, air, and water) that the agency considers protective of humans (including sensitive groups), over a lifetime. Chemical concentrations above these levels would not automatically designate a site as "dirty" or trigger a response action. However, exceeding a PRG suggests that further evaluation of the potential risks that may be posed by site contaminants is appropriate. Further evaluation may include additional sampling, consideration of ambient levels in the environment, or a reassessment of the assumptions contained in these screening-level estimates (e.g. appropriateness of route-to-route extrapolations, appropriateness of using chronic toxicity values to evaluate childhood exposures, appropriateness of generic exposure factors for a specific site etc.).

The PRG concentrations presented in the table can be used to screen pollutants in environmental media, trigger further investigation, and provide an initial cleanup goal if applicable. When considering PRGs as cleanup goals, residential concentrations should be used for maximum beneficial uses of a property. Industrial concentrations are included in the table as an alternative cleanup goal for soils. **In general, it recommended that industrial PRGs not be used for screening sites unless they are used in conjunction with residential values.**

Before applying PRGs as screening tools or initial goals, the user of the table should consider whether the exposure pathways and exposure scenarios at the site are fully accounted for in the PRG calculations. Region 9 PRG concentrations are based on direct contact pathways for which generally accepted methods, models, and assumptions have been developed (i.e. ingestion, dermal contact, and inhalation) for specific land-use conditions and do not consider impact to groundwater or ecological receptors (see Developing a Conceptual Site Model below).

EXHIBIT 1-1
TYPICAL EXPOSURE PATHWAYS BY MEDIUM
FOR RESIDENTIAL AND INDUSTRIAL LAND USES[a]

EXPOSURE PATHWAYS, ASSUMING:		
MEDIUM	RESIDENTIAL LAND USE	INDUSTRIAL LAND USE
Ground Water	***Ingestion from drinking***	Ingestion from drinking
	Inhalation of volatiles	Inhalation of volatiles
	Dermal absorption from bathing	Dermal absorption
Surface Water	***Ingestion from drinking***	Ingestion from drinking
	Inhalation of volatiles	Inhalation of volatiles
	Dermal absorption from bathing	Dermal absorption
	Ingestion during swimming	
	Ingestion of contaminated fish	
Soil	***Ingestion***	***Ingestion***
	Inhalation of particulates	***Inhalation of particulates***
	Inhalation of volatiles	***Inhalation of volatiles***
	Exposure to indoor air from soil gas	Exposure to indoor air from soil gas
	Exposure to ground water contaminated by soil leachate	Exposure to ground water contaminated by soil leachate
	Ingestion via plant, meat, or dairy products	Inhalation of particulates from trucks and heavy equipment
	Dermal absorption	***Dermal absorption***

Footnote:
[a]Exposure pathways considered in the PRG calculations are indicated in boldface italics.

2.0 READING THE PRG TABLE

2.1 General Considerations

With the exceptions described below, PRGs are chemical concentrations that correspond to fixed levels of risk (i.e. either a one-in-one million [10^{-6}] cancer risk or a noncarcinogenic hazard quotient of 1) in soil, air, and water. In most cases, where a substance causes both cancer and noncancer (systemic) effects, the 10^{-6} cancer risk will result in a more stringent criteria and consequently this value is presented in the printed copy of the table. PRG concentrations that equate to a 10^{-6} cancer risk are indicated by "ca". PRG concentrations that equate to a hazard quotient of 1 for noncarcinogenic concerns are indicated by "nc".

If the risk-based concentrations are to be used for site screening, it is recommended that both cancer and noncancer-based PRGs be used. Both carcinogenic and noncarcinogenic values may be obtained at the Region 9 PRG homepage at:

http://www.epa.gov/region09/waste/sfund/prg/

It has come to my attention that some users have been multiplying the cancer PRG concentrations by 10 or 100 to set "action levels" for triggering remediation or to set less stringent cleanup levels for a specific site after considering non-risk-based factors such as ambient levels, detection limits, or technological feasibility. This risk management practice recognizes that there may be a range of values that may be "acceptable" for carcinogenic risk (EPA's risk management range is one-in-a-million [10^{-6}] to one-in-ten thousand [10^{-4}]). However, this practice could lead one to overlook serious noncancer health threats and it is strongly recommended that the user consult with a toxicologist or regional risk assessor before doing this. For carcinogens, I have indicated by asterisk ("ca*") in the PRG table where the noncancer PRGs would be exceeded if the cancer value that is displayed is multiplied by 100. Two stars ("ca**") indicate that the noncancer values would be exceeded if the cancer PRG were multiplied by 10. There is no range of "acceptable" noncarcinogenic "risk" so that under no circumstances should noncancer PRGs be multiplied by 10 or 100, when setting final cleanup criteria. In the rare case where noncancer PRGs are more stringent than cancer PRGs set at one-in-one-million risk, a similar approach has been applied (e.g. "nc**").

In general, PRG concentrations in the printed table are risk-based but for soil there are two important exceptions: (1) for several volatile chemicals, PRGs are based on the soil saturation equation ("sat") and (2) for relatively less toxic inorganic and semivolatile contaminants, a non-risk based "ceiling limit" concentration is given as 10^{+5} mg/kg ("max"). At the Region 9 PRG website, the risk-based calculations for these same chemicals are also available in the "InterCalc Tables" if the user wants to view the risk-based concentrations prior to the application of "sat" or "max". For more information on why the "sat" value and not a risk-based value is presented for several volatile chemicals in the PRGs table, please see the discussion in Section 4.5.

With respect to applying a "ceiling limit" for chemicals other than volatiles, it is recognized that this is not a universally accepted approach. Some within the agency argue that all values should be risk-based to allow for scaling (for example, if the risk-based PRG is set at a hazard quotient = 1.0, and the user would like to set the hazard quotient to 0.1 to take into account multiple chemicals, then this is as simple as multiplying the risk-based PRG by 1/10th). If scaling is necessary, PRG users can do

this simply by referring to the "InterCalc Tables" at our website where risk-based soil concentrations are presented for all chemicals (see soil calculations, "combined" pathways column).
In spite of the fact that applying a ceiling limit is not a universally accepted approach, we have opted to continue applying a "max"soil concentration to the PRGs table for the following reasons:

- Risk-based PRGs for some chemicals in soil exceed unity (>1,000,000 mg/kg) which is not possible.

- The ceiling limit of 10^{+5} mg/kg is equivalent to a chemical representing 10% by weight of the soil sample. At this contaminant concentration (and higher), the assumptions for soil contact may be violated (for example, soil adherence and windborne dispersion assumptions) due to the presence of the foreign substance itself.
- PRGs currently do not address short-term exposures (e.g. pica children and construction workers). Although extremely high soil PRGs are likely to represent relatively non-toxic chemicals, such high values may not be justified if in fact more toxicological data were available for evaluating short-term and/or acute exposures.

In addition to Region 9 PRG values, the PRGs table also includes California EPA PRGs ("CAL-Modified PRGs") for specific chemicals where CAL-EPA screening values may be "significantly" more restrictive than the federal values (see Section 2.4) and EPA OSWER soil screening levels (SSLs) for protection of groundwater (see Section 2.5).

2.2 Toxicity Values

Hierarchy of Toxicity Values

EPA toxicity values, known as noncarcinogenic reference doses (RfD) and carcinogenic slope factors (SF) were obtained from IRIS, NCEA through September 2002, and HEAST (1997). The priority among sources of toxicological constants in order of preference is as follows: (1) IRIS (indicated by "i"), (2) NCEA ("n"), (3) HEAST ("h"), (4) withdrawn from IRIS or HEAST and under review ("x") or obtained from other EPA documents ("o"). This hierarchy is subject to change once the HEAST tables are updated.

Inhalation Conversion Factors

As of January 1991, IRIS and NCEA databases no longer present RfDs or SFs for the inhalation route. These criteria have been replaced with reference concentrations (RfC) for noncarcinogenic effects and unit risk factors (URF) for carcinogenic effects. However, for purposes of estimating risk and calculating risk-based concentrations, inhalation reference doses (RfDi) and inhalation slope factors (SFi) are preferred. This is not a problem for most chemicals because the inhalation toxicity criteria are easily converted. To calculate an RfDi from an RfC, the following equation and assumptions may be used for most chemicals:

$$\mathrm{RfDi}\ \frac{mg}{(kg\text{-}day)} = \mathrm{RfC}\ (mg/m^3) \times \frac{20 m^3}{day} \times \frac{1}{70 kg}$$

Likewise, to calculate an SFi from an inhalation URF, the following equation and assumptions may be used:

$$SFi\ \frac{(kg\text{-}day)}{(mg)} = URF(m^3/ug) \times \frac{day}{20m^3} \times 70kg \times \frac{10^3\ ug}{mg}$$

Substances with New or Withdrawn Toxicity Values

To help users rapidly identify substances with new or revised toxicity values, these chemicals are listed in boldface type in the PRGs table. This issue of the table contains new or revised toxicity values for: **acetonitrile, benzyl chloride, boron, bromate, 1,3-butadiene, 1-butanol, butylbenzenes, cacodylic acid, cadmium (California State value), chloroform, chloronitrobenzenes, chrysene (California State value), cobalt, 1,2-dibromo-3-chloropropane (California State value), 1,1-dichloroethylene, diethylene glycol ethers, diethylformamide, dinitrobenzenes, di-n-octyl phthalate, diphenyl sulfone, ethylbenzene, HCH, hexachlorocyclopentadiene, kepone, lead (California State value), MTBE, 2-nitroaniline, carcinogenic PAHs, perchlorate, polychlorinated terphenyls, benzo(k)fluoranthene (California State value), propylbenzene, propylene glycol, quinoline, tetrachloroethylene, tetrahydrofuran, thiocyanate, 1,1,1-trichloroethane, trichloroethylene, 2,4,6-trichlorophenol, 1,2,3-trichloropropane, triphenylphosphine oxide, tris(2-chloroethyl) phosphate, vinyl chloride, and xylene.**

Chemicals that have been delisted because they are outdated, undocumented, or derived from a data base other than IRIS, HEAST or NCEA include: acifluorfen, 4-bromophenyl phenyl ether, chloroacetaldehyde, 2-chloroethyl vinyl ether, hexachlorodibenzo-p-dioxin mixture (HxCDD), maneb, methyl chlorocarbonate, nitrapyrin, nitric oxide, and 4-nitrophenol.

Route-to-Route Methods

Route-to-route extrapolations ("r") were frequently used when there were no toxicity values available for a given route of exposure. Oral cancer slope factors ("SFo") and reference doses ("RfDo") were used for both oral and inhaled exposures for organic compounds lacking inhalation values. Inhalation slope factors ("SFi") and inhalation reference doses ("RfDi") were used for both inhaled and oral exposures for organic compounds lacking oral values. Route extrapolations were not performed for inorganics due to portal of entry effects and known differences in absorption efficiency for the two routes of exposure.

An additional route extrapolation is the use of oral toxicity values for evaluating dermal exposures. For many chemicals, a scientifically defensible data base does not exist for making an adjustment to the oral slope factor/RfD to estimate a dermal toxicity value. Based on the current guidance (USEPA 2001b), the only chemical for which an adjustment is recommended is cadmium. An oral absorption efficiency of 5% is assumed for cadmium which leads to an estimated dermal reference dose (RfDd) of 2.5E-05 that was used in the soil PRG calculations for cadmium.

Although route-to-route methods may be a useful screening procedure, the appropriateness of these default assumptions for specific contaminants should be verified by a toxicologist or regional risk assessor. Please note that whenever route-extrapolated values are used to calculate risk-based PRGs, additional uncertainties are introduced in the calculation.

2.3 Region 9 PRGs Derived with Special Considerations

Most of the Region 9 PRGs are readily derived by referring to Equations 4-1 thru 4-8 contained in this "User's Guide/Technical Background Document" to the Region 9 PRGs. However, there are some chemicals for which the standard equations do no apply and/or adjustments to the toxicity values are recommended. These special case chemicals are discussed below.

Cadmium The PRGs for Cadmium are based on the oral RfD for water which is slightly more conservative (by a factor of 2) than the RfD for food. Because the PRGs are considered screening values, we elected to use the more conservative RfD for cadmium. However, reasonable arguments could be made for applying an RfD for food (instead of the oral RfD for water) for some media such as soils.

The water RfD for cadmium assumes a 5% oral absorption factor. The assumption of an oral absorption efficiency of 5% for Cadmium leads to an estimated dermal RfD of 2.5E-05. The PRG calculations incorporate these adjustments per recent guidance (USEPA 2001b).

Chromium 6 For Chromium 6 (Cr6), IRIS shows an air unit risk of 1.2E-2 per (ug/cu.m) or expressed as an inhalation cancer slope factor (adjusting for inhalation/body weight) of 42 (mg/kg-day) $^{-1}$. However, the supporting documentation in the IRIS file states that these toxicity values are based on an assumed 1:6 ratio of Cr6:Cr3. Because of this assumption, we in Region 9 prefer to present PRGs based on these cancer toxicity values as "total chromium" numbers.

In the PRG tables, we also include a Cr6 specific value (assuming 100% Cr6) that is derived by multiplying the "total chromium" value by 7, yielding a cancer potency factor of 290 (mg/kg-day)$^{-1}$. This is considered to be an overly conservative assumption by some within the Agency. However, this calculation is also consistent with the State of California's interpretation of the Mancuso study that forms the basis of Cr6's toxicity values.

If you are working on a project outside of California (and outside of Region 9), you may want to contact the appropriate regulatory officials to determine what their position is on this issue. As mentioned, Region 9 also includes PRGs for "total chromium" which is based on the same ratio (1:6 ratio Cr6:Cr3) that forms the basis of the cancer slope factor of 42 (mg/kg-day)$^{-1}$ presented in IRIS.

Lead Residential PRGs for Lead (Region 9 EPA and California EPA) are derived based on pharmacokinetic models. Both EPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model and California's LeadSpread model are designed to predict the probable blood lead concentrations for children between six months and seven years of age who have been exposed to lead through various sources (air, water, soil, dust, diet and *in utero* contributions from the mother). Run in the reverse, these models also allow the user to calculate lead PRGs that are considered "acceptable" by EPA or the State of California.

The California LeadSpread model can also estimate PRGs for non-residential exposures (e.g. worker) whereas EPA uses a second Adult Lead Model to estimate PRGs for an industrial setting.

For more information on EPA' Lead models used to estimate residential and industrial PRGs, please refer to the following website:

http://www.epa.gov/oerrpage/superfund/programs/lead/

For more information on California's LeadSpread Model and Cal-Modified PRGs for lead, please go to:
http://www.dtsc.ca.gov/ScienceTechnology/ledspred.html

Manganese The IRIS RfD (0.14 mg/kg-day) includes manganese from all sources, including diet. The author of the IRIS assessment for manganese recommends that the dietary contribution from the normal U.S. diet (an upper limit of 5 mg/day) be subtracted when evaluating non-food (e.g. drinking water or soil) exposures to manganese, leading to a RfD of 0.071 mg/kg-day for non-food items. The explanatory text in IRIS further recommends using a modifying factor of 3 when calculating risks associated with non-food sources due to a number of uncertainties that are discussed in the IRIS file for manganese, leading to a RfD of 0.024 mg/kg-day. This modified RfD is applied in the derivation of the Region 9 PRGs for soil and water. For more information regarding the Manganese RfD, you may want to contact Dr. Bob Benson at (303) 312-7070.

Nitrates/Nitrates Tap water PRGs for Nitrates/Nitrites are based on the MCL as there is no available RfD for these compounds. For more information, please see IRIS at:
http://www.epa.gov/iriswebp/iris/index.html

Thallium IRIS has many values for the different salts of thallium. However, our analytical data packages typically report "thallium". Therefore, as a practical matter it makes more sense to report a PRG for plain thallium. We have done this by making the adjustment contained in the IRIS file for thallium sulfate based on the molecular weight of the thallium in the thallium salt. The adjusted oral RfD for plain thallium is 6.6 E-05 mg/kg-day which we use to calculate a thallium PRG.

Vinyl Chloride In EPA's recent reassessment of vinyl chloride toxicity, IRIS presents two cancer slope factors for vinyl chloride (VC): one that is intended to be applied towards evaluating adult risks and a second more protective slope factor that takes into account the unique susceptibility of developing infants and young children. For residential PRGs, the Region 9 PRGs table applies the more conservative cancer potency factor that addresses exposures to both children and adults whereas for the industrial soils PRG, the adult only cancer slope factor is applied.

Because of the age-dependent vulnerability associated with vinyl chloride exposures, and due to the method that is applied in deriving the cancer slope factor for VC, an assumption of a 70 year exposure over the lifetime is assumed, consistent with the way that the toxicity value for VC was derived. Therefore, instead of the usual exposure assumption of 6 years as a child and 24 years as an adult that is assumed for carcinogenic substances, we have revised the exposure assumption for VC to 6 years as a child and 64 years as adult. Since most of the cancer risk is associated with the first 30 years of exposure to VC, there is actually little difference between a 30 year exposure assumption (typically assumed for Superfund risk assessments) and the 70 year exposure assumption that is assumed in calculating the PRG for VC.

2.4 "Cal-Modified PRGs"

When EPA Region 9 first came out with a Draft of the PRGs table in 1992, there was concern expressed by California EPA's Department of Toxic Substances and Control (DTSC) that for some chemicals the risk-based concentrations calculated using Cal-EPA toxicity values were "significantly" more protective than the risk-based PRGs calculated by Region 9. At an interagency meeting

comprised of mostly toxicologists, it was agreed that PRG values are at best order-of-magnitude estimates, so that if we assume a logarithmic scale, then a difference greater than 3.3 (½ log above or below) would be considered a significant difference. Therefore, for individual chemicals where California PRG values are significantly more protective than Region 9 EPA PRGs, Cal-Modified PRGs are included in the Region 9 PRGs table. For more information on Cal-Modified PRGs, the reader may want to contact Dr. Michael Wade in Cal-EPA's Department of Toxic Substances (DTSC) at (916) 255-6653.

Please note that in the State of California, Cal-Modified PRGs should be used as screening levels for contaminated sites because they are more stringent than the Federal numbers.

2.5 Soil Screening Levels

Generic, soil screening levels (SSLs) for the protection of groundwater have been included in the PRG table for 100 of the most common contaminants at Superfund sites. Generic SSLs are derived using default values in standardized equations presented in EPA OSWER's *Soil Screening Guidance* series, available on the web at http://www.epa.gov/superfund/resources/soil/index.htm .

The SSLs were developed using a default dilution-attenuation factor (DAF) of 20 to account for natural processes that reduce contaminant concentrations in the subsurface. Also included are generic SSLs that assume no dilution or attenuation between the source and the receptor well (i.e., a DAF of 1). These values can be used at sites where little or no dilution or attenuation of soil leachate concentrations is expected at a site (e.g., sites with shallow water tables, fractured media, karst topography, or source size greater than 30 acres).

In general, if an SSL is not exceeded for the migration to groundwater pathway, the user may eliminate this pathway from further investigation.

It should be noted that in the State of California, the California Regional Water Quality Control Board has derived "California SSLs" for a number of pathways including migration to groundwater. These are not included in the Region 9 PRGs table, but may be accessed at the following website:

http://www.swrcb.ca.gov/rwqcb2/rbsl.htm

Or, for more information on the "California SSLs", please contact Dr Roger Brewer at: (510) 622-2374.

2.6 Miscellaneous

Volatile organic compounds (VOCs) are indicated by "1" in the VOC column of the table and in general, are defined as those chemicals having a Henry's Law constant greater than 10^{-5} (atm-m^3/mol) and a molecular weight less than 200 g/mole). Three borderline chemicals (dibromochloromethane, 1,2-dibromochloropropane, and pyrene) which do not strictly meet these criteria of volatility have also been included based upon discussions with other state and federal agencies and after a consideration of vapor pressure characteristics etc. Volatile organic chemicals are evaluated for potential volatilization from soil/water to air using volatilization factors (see Section 4.1).

Chemical-specific dermal absorption values for contaminants in soil and dust are presented for arsenic, cadmium, chlordane, 2,4-D, DDT, lindane, TCDD, PAHs, PCBs, and pentachlorophenols as recommended in the "Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim Guidance" (USEPA 2001b). Otherwise, default skin absorption fractions are assumed to be 0.10 for nonvolatile organics. Please note that previous defaults of 0.01 and 0.10 for inorganics and VOCs respectively, have been withdrawn per new guidance.

3.0 USING THE PRG TABLE

The decision to use PRGs at a site will be driven by the potential benefits of having generic risk-based concentrations in the absence of site-specific risk assessments. The original intended use of PRGs was to provide initial cleanup goals for individual chemicals given specific medium and land-use combinations (see RAGS Part B, 1991), however risk-based concentrations have several applications. They can also be used for:

- Setting health-based detection limits for chemicals of potential concern
- Screening sites to determine whether further evaluation is appropriate
- Calculating cumulative risks associated with multiple contaminants

A few basic procedures are recommended for using PRGs properly. These are briefly described below. Potential problems with the use of PRGs are also identified.

3.1 Developing a Conceptual Site Model

The primary condition for use of PRGs is that exposure pathways of concern and conditions at the site match those taken into account by the PRG framework. Thus, it is always necessary to develop a conceptual site model (CSM) to identify likely contaminant source areas, exposure pathways, and potential receptors. This information can be used to determine the applicability of PRGs at the site and the need for additional information. For those pathways not covered by PRGs, a risk assessment specific to these additional pathways may be necessary. Nonetheless, the PRG lookup values will still be useful in such situations for focusing further investigative efforts on the exposure pathways not addressed.

To develop a site-specific CSM, perform an extensive records search and compile existing data (e.g. available site sampling data, historical records, aerial photographs, and hydrogeologic information). Once this information is obtained, CSM worksheets such as those provided in ASTM's *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites* (1995) can be used to tailor the generic worksheet model to a site-specific CSM. The final CSM diagram represents linkages among contaminant sources, release mechanisms, exposure pathways and routes and receptors. It summarizes our understanding of the contamination problem.

As a final check, the CSM should answer the following questions:

- Are there potential ecological concerns?
- Is there potential for land use other than those covered by the PRGs (that is, residential and industrial)?

- Are there other likely human exposure pathways that were not considered in development of the PRGs (e.g. impact to groundwater, local fish consumption, raising beef, dairy, or other livestock)?

- Are there unusual site conditions (e.g. large areas of contamination, high fugitive dust levels, potential for indoor air contamination)?

If any of these four conditions exist, the PRG may need to be adjusted to reflect this new information. Suggested websites for the evaluation of pathways not currently addressed by Region 9 PRG's are presented in Exhibit 3-1.

EXHIBIT 3-1
SUGGESTED WEBSITES FOR EVALUATING EXPOSURE PATHWAYS NOT CURRENTLY ADDRESSED BY REGION 9 PRGs

EXPOSURE PATHWAY	WEBSITE
Migration of contaminants to an underlying potable aquifer	EPA Soil Screening Guidance: http://www.epa.gov/superfund/resources/soil/index.htm California Water Board Guidance: http://www.swrcb.ca.gov/rwqcb2/rbsl.htm
Ingestion via plant uptake	EPA Soil Screening Guidance: http://www.epa.gov/superfund/resources/soil/index.htm EPA Fertilizer Risk Assessment: http://www.epa.gov/epaoswer/hazwaste/recycle/fertiliz/risk/
Ingestion via meat, dairy products, human milk	EPA Protocol for Combustion Facilities: http://www.epa.gov/epaoswer/hazwaste/combust/riskvol.htm#volume1 California "Hot Spots" Risk Guidelines: http://www.oehha.ca.gov/air/hot_spots/HRSguide.html
Inhalation of volatiles that have migrated into basements or other enclosed spaces.	EPA's Version of Johnson & Ettinger Model: http://www.epa.gov/oerrpage/superfund/programs/risk/airmodel/johnson_ettinger.htm
Ecological pathways	EPA Ecological Soil Screening Guidance: http://www.epa.gov/superfund/programs/risk/ecorisk/ecossl.htm NOAA Sediment Screening Table: http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html

3.2 Background Levels Evaluation

A necessary step in determining the applicability of Region 9 risk-based PRGs is the consideration of background contaminant concentrations. There is new EPA guidance on determining background at sites. *Guidance for Characterizing Background Chemicals in Soil at Superfund Sites* (USEPA 2001c) is available on the web at: http://www.epa.gov/superfund/programs/risk/background.pdf .

EPA may be concerned with two types of background at sites: naturally occurring and anthropogenic. Natural background is usually limited to metals whereas anthropogenic (i.e. human-made) "background" includes both organic and inorganic contaminants. Before embarking on an extensive sampling and analysis program to determine local background concentrations in the area, one should first compile existing data on the subject. Far too often there is pertinent information in the literature that gets ignored, resulting in needless expenditures of time and money.

Generally EPA does not clean up below natural background. In some cases, the predictive risk-based models generate PRG levels that lie within or even below typical background. If natural background concentrations are higher than the risk-based PRGs, an adjustment of the PRG is probably needed. Exhibit 3-2 presents summary statistics for selected elements in soils that have background levels that may exceed risk-based PRGs. An illustrative example of this is naturally occurring arsenic in soils which frequently is higher than the risk-based concentration set at a one-in-one-million cancer risk (the PRG for residential soils is 0.39 mg/kg). After considering background concentrations in a local area, EPA Region 9 has at times used the non-cancer PRG (22 mg/kg) to evaluate sites recognizing that this value tends to be above background levels yet still falls within the range of soil concentrations (0.39-39 mg/kg) that equates to EPA's "acceptable" cancer risk range of 10E-6 to 10E-4.

Where anthropogenic "background" levels exceed PRGs and EPA has determined that a response action is necessary and feasible, EPA's goal will be to develop a comprehensive response to the widespread contamination. This will often require coordination with different authorities that have jurisdiction over the sources of contamination in the area.

EXHIBIT 3-2
BACKGROUND CONCENTRATIONS OF SELECTED ELEMENTS IN SOILS

TRACE	U.S. STUDY DATA[1]			CALIFORNIA DATA[2]		
ELEMENT	Range	GeoMean	ArMean	Range	GeoMean	ArMean
Arsenic	<.1-97	5.2 mg/kg	7.2 mg/kg	0.59-11	2.75 mg/kg	3.54 mg/kg
Beryllium	<1-15	0.63 "	0.92 "	0.10-2.7	1.14 "	1.28 "
Cadmium	<1-10	--	<1	0.05-1.7	0.26	0.36
Chromium	1-2000	37	54	23-1579	76.25	122.08
Nickel	<5-700	13	19	9.0-509	35.75	56.60

[1]Shacklette and Hansford, "Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States",USGS Professional Paper 1270, 1984.

[2]Bradford et. al, "Background Concentrations of Trace and Major Elements in California Soils", Kearney Foundation Special Report, UC-Riverside and CAL-EPA DTSC, March 1996.

3.3 Screening Sites with Multiple Pollutants

A suggested stepwise approach for PRG-screening of sites with multiple pollutants is as follows:

- Perform an extensive records search and compile existing data.

- Identify site contaminants in the PRG table. Record the PRG concentrations for various media and note whether PRG is based on cancer risk (indicated by "ca") or noncancer hazard (indicated by "nc"). Segregate cancer PRGs from non-cancer PRGs and exclude (but don't eliminate) non-risk based PRGs ("sat" or "max").

- For cancer risk estimates, take the site-specific concentration (maximum or 95 UCL) and divide by the PRG concentrations that are designated for cancer evaluation ("ca"). Multiply this ratio by 10^{-6} to estimate chemical-specific risk for a reasonable maximum exposure (RME). For multiple pollutants, simply add the risk for each chemical:

$$Risk = \left[\left(\frac{conc_x}{PRG_x}\right) + \left(\frac{conc_y}{PRG_y}\right) + \left(\frac{conc_z}{PRG_z}\right)\right] \times 10^{-6}$$

- For non-cancer hazard estimates. Divide the concentration term by its respective non-cancer PRG designated as "nc" and sum the ratios for multiple contaminants. The cumulative ratio represents a non-carcinogenic hazard index (HI). A hazard index of 1 or less is generally considered "safe". A ratio greater than 1 suggests further evaluation. **[Note that carcinogens may also have an associated non-cancer PRG that is not listed in the printed copy of the table sent to folks on the mailing list. To obtain these values, the user should view or download the PRG table at our website and display the appropriate sections.]**

$$Hazard\ Index = \left[\left(\frac{conc_x}{PRG_x}\right) + \left(\frac{conc_y}{PRG_y}\right) + \left(\frac{conc_z}{PRG_z}\right)\right]$$

For more information on screening site risks, the reader should contact EPA Region 9's Technical Support Team.

3. 4 Potential Problems

As with any risk-based tool, the potential exists for misapplication. In most cases the root cause will be a lack of understanding of the intended use of Region 9 PRGs. In order to prevent misuse of PRGs, the following should be avoided:

- Applying PRGs to a site without adequately developing a conceptual site model that identifies relevant exposure pathways and exposure scenarios,

- Not considering background concentrations when choosing PRGs as cleanup goals,

- Use of PRGs as cleanup levels without the nine-criteria analysis specified in the

National Contingency Plan (or, comparable analysis for programs outside of Superfund),

- Use of PRGs as cleanup levels without verifying numbers with a toxicologist or regional risk assessor,

Use of antiquated PRG tables that have been superseded by more recent publications,

- Not considering the effects of additivity when screening multiple chemicals, and
- Adjusting PRGs upward by factors of 10 or 100 without consulting a toxicologist or regional risk assessor.

4.0 TECHNICAL SUPPORT DOCUMENTATION

Region 9 PRGs consider human exposure hazards to chemicals from contact with contaminated soils, air, and water. The emphasis of the PRG equations and technical discussion are aimed at developing screening criteria for soils, since this is an area where few standards exist. For air and water, additional reference concentrations or standards are available for many chemicals (e.g. MCLs, non-zero MCLGs, AWQC, and NAAQS) and consequently the discussion of these media are brief.

4.1 Soils - Direct Ingestion

Calculation of risk-based PRGs for direct ingestion of soil is based on methods presented in RAGS HHEM, Part B (USEPA 1991a) and *Soil Screening Guidance* (USEPA 1996a,b, USEPA 2001a). Briefly, these methods backcalculate a soil concentration level from a target risk (for carcinogens) or hazard quotient (for noncarcinogens).

Residential Soil PRGs

A number of studies have shown that inadvertent ingestion of soil is common among children 6 years old and younger (Calabrese et al. 1989, Davis et al. 1990, Van Wijnen et al. 1990). To take into account the higher soil intake rate for children, two different approaches are used to estimate PRGs, depending on whether the adverse health effect is cancer or some effect other than cancer.

For carcinogens, the method for calculating PRGs uses an age-adjusted soil ingestion factor that takes into account the difference in daily soil ingestion rates, body weights, and exposure duration for children from 1 to 6 years old and others from 7 to 31 years old. This health-protective approach is chosen to take into account the higher daily rates of soil ingestion in children as well as the longer duration of exposure that is anticipated for a long-term resident. For more on this method, see USEPA RAGs Part B (1991a).

For noncarcinogenic concerns, the more protective method of calculating a soil PRG is to evaluate childhood exposures separately from adult exposures. In other words, an age-adjustment factor is not applied as was done for carcinogens. This approach is considered conservative because it combines the higher 6-year exposure for children with chronic toxicity criteria. In their analysis of the method, the Science Advisory Board (SAB) indicated that, for most chemicals, the approach may be overly

protective. However, they noted that there are specific instances when the chronic RfD may be based on endpoints of toxicity that are specific to children (e.g. fluoride and nitrates) or when the dose-response is steep (i.e., the dosage difference between the no-observed-adverse-effects level [NOAEL] and an adverse effects level is small). Thus, for the purposes of screening, EPA Region 9 has adopted this approach for calculating soil PRGs for noncarcinogenic health concerns.

Industrial Soil PRGs

In the new *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (Supplemental SSL Guidance, EPA 2001a), two different soil ingestion rates are assumed for non-construction workers: 100 mg/day is assumed for outdoor workers whereas 50 mg/day is assumed for indoor workers. The default value of 100 mg/day for outdoor workers is also recommended by EPA's Technical Review Workgroup for Lead (TRW), and it reflects increased exposures to soils for outdoor workers relative to their indoor counterparts. For more on this, please see the Supplemental SSL Guidance available at the following website:

http://www.epa.gov/superfund/resources/soil/index.htm

Because the Region 9 PRGs are generic and intended for screening sites early in the investigation process (often before site-specific information is available), we have chosen to use the 100 mg/day soil ingestion (i.e. outdoor worker) assumption to calculate industrial soil PRGs. Please note that previous issues of the Region 9 PRGs table assumed 50 mg/day soil ingestion rate for workers. This change in soil ingestion rates is reflected in a somewhat lower (more stringent) industrial soils PRG for many contaminants. The appropriateness of this assumption for a particular site may be evaluated when additional information becomes available regarding site conditions or site development.

4.2 Soils - Vapor and Particulate Inhalation

Agency toxicity criteria indicate that risks from exposure to some chemicals via inhalation far outweigh the risk via ingestion; therefore soil PRGs have been designed to address this pathway as well. The models used to calculate PRGs for inhalation of volatiles/particulates are updates of risk assessment methods presented in RAGS Part B (USEPA 1991a) and are identical to the *Soil Screening Guidance: User's Guide and Technical Background Document* (USEPA 1996a,b).

It should be noted that the soil-to-air pathway that is evaluated in the PRGs calculations is based on direct inhalation exposures that result from the volatilization or particulate emissions of chemicals from soil to outdoor air. The soil PRG calculations currently do not evaluate potential for volatile contaminants in soil to migrate indoors. For this evaluation, a site-specific assessment is required because the applicable model, the Johnson and Ettinger model, is extremely sensitive to a number of model parameters that do not lend themselves to standardization on a national basis. For more information on the indoor air model and/or to download a copy, please go to:

http://www.epa.gov/oerrpage/superfund/programs/risk/airmodel/johnson_ettinger.htm

To address the soil-to-outdoor air pathways, the PRG calculations incorporate volatilization factors (VF_s) for volatile contaminants and particulate emission factors (PEF) for nonvolatile contaminants. These factors relate soil contaminant concentrations to air contaminant concentrations that may be inhaled on-site. The VF_s and PEF equations can be broken into two separate models: an emission model to estimate emissions of the contaminant from the soil and a dispersion model to simulate the dispersion of the contaminant in the atmosphere.

The box model in RAGS Part B has been replaced with a dispersion term (Q/C) derived from a modeling exercise using meteorological data from 29 locations across the United States because the box model may not be applicable to a broad range of site types and meteorology and does not utilize state-of-the-art techniques developed for regulatory dispersion modeling. The dispersion model for both volatiles and particulates is the AREA-ST, an updated version of the Office of Air Quality Planning and Standards, Industrial Source Complex Model, ISC2. However, different Q/C terms are used in the VF and PEF equations. Los Angeles was selected as the 90th percentile data set for volatiles and Minneapolis was selected as the 90th percentile data set for fugitive dusts (USEPA1996 a,b). A default source size of 0.5 acres was chosen for the PRG calculations. This is consistent with the default exposure area over which Region 9 typically averages contaminant concentrations in soils. If unusual site conditions exist such that the area source is substantially larger than the default source size assumed here, an alternative Q/C could be applied (see USEPA 1996a,b).

Volatilization Factor for Soils

Volatile chemicals, defined as those chemicals having a Henry's Law constant greater than 10^{-5} (atm-m^3/mol) and a molecular weight less than 200 g/mole, were screened for inhalation exposures using a volatilization factor for soils (VF_s). Please note that VF_s's are available at our website.

The emission terms used in the VF_s are chemical-specific and were calculated from physical-chemical information obtained from several sources. The priority of these sources were as follows: *Soil Screening Guidance* (USEPA 1996a,b), *Superfund Chemical Data Matrix* (USEPA 1996c), *Fate and Exposure Data* (Howard 1991), *Subsurface Contamination Reference Guide* (EPA 1990a), and *Superfund Exposure Assessment Manual* (SEAM, EPA 1988). When there was a choice between a measured or a modeled value (e.g. Koc), we went with modeled values. In those cases where Diffusivity Coefficients (Di) were not provided in existing literature, Di's were calculated using Fuller's Method described in SEAM. A surrogate term was required for some chemicals that lacked physico-chemical information. In these cases, a proxy chemical of similar structure was used that may over- or under-estimate the PRG for soils.

Equation 4-9 forms the basis for deriving generic soil PRGs for the inhalation pathway. The following parameters in the standardized equation can be replaced with specific site data to develop a simple site-specific PRG

- Source area
- Average soil moisture content
- Average fraction organic carbon content
- Dry soil bulk density

The basic principle of the VF_s model (Henry's law) is applicable only if the soil contaminant concentration is at or below soil saturation "sat". Above the soil saturation limit, the model cannot predict an accurate VF-based PRG. How these particular cases are handled, depends on whether the contaminant is liquid or solid at ambient soil temperatures (see Section 4.5).

Particulate Emission Factor for Soils

Inhalation of chemicals adsorbed to respirable particles (PM_{10}) were assessed using a default PEF equal to 1. 316 x 10^9 m^3/kg that relates the contaminant concentration in soil with the concentration of respirable particles in the air due to fugitive dust emissions from contaminated soils. The generic PEF was derived using default values in Equation 4-11, which corresponds to a receptor point concentration of approximately 0.76 ug/m^3. The relationship is derived by Cowherd (1985) for a rapid assessment procedure applicable to a typical hazardous waste site where the surface contamination provides a relatively continuous and constant potential for emission over an extended period of time (e.g. years). This represents an annual average emission rate based on wind erosion that should be compared with chronic health criteria; it is not appropriate for evaluating the potential for more acute exposures.

The impact of the PEF on the resultant PRG concentration (that combines soil exposure pathways for ingestion, skin contact, and inhalation) can be assessed by accessing the Region 9 PRG website and viewing the pathway-specific soil concentrations. Equation 4-11 forms the basis for deriving a generic PEF for the inhalation pathway. For more details regarding specific parameters used in the PEF model, the reader is referred to *Soil Screening Guidance: Technical Background Document* (USEPA 1996a).

Note: the generic PEF evaluates windborne emissions and does not consider dust emissions from traffic or other forms of mechanical disturbance that could lead to greater emissions than assumed here.

4.3 Soils - Dermal Exposure

Dermal Contact Assumptions

Exposure factors for dermal contact with soil are based on recommendations in "Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim Guidance" (USEPA 2001b). Recommended RME (reasonable maximum exposure) defaults for adult workers' skin surface areas (3300 cm^2/day) and soil adherence factors (0.2 mg/cm^2) now differ from the defaults recommended for adult residents (5700 cm^2/day, 0.07 mg/cm^2) as noted in Exhibit 4-1. This is due to differences in the range of activities experienced by workers versus residents.

Dermal Absorption

Chemical-specific skin absorption values recommended by the Superfund Dermal Workgroup were applied when available. Chemical-specific values are included for the following chemicals: arsenic, cadmium, chlordane, 2,4-D, DDT, lindane, TCDD, PAHs, PCBs, and pentachlorophenols.

The "Supplemental Guidance for Dermal Risk Assessment" (USEPA 2001b) recommends a default dermal absorption factor for semivolatile organic compounds of 10% as a screening method for the majority of SVOCs without dermal absorption factors. Default dermal absorption values for other chemicals (VOCs and inorganics) are not recommended in this new guidance. Therefore, the assumption of 1% for inorganics and 10% for volatiles is no longer included in the Region 9 PRG table. This change has minimal impact on the final risk-based calculations because human exposure to VOCs and inorganics in soils is generally driven by other pathways of exposure.

4.4 Soils - Migration to Groundwater

The methodology for calculating SSLs for the migration to groundwater was developed to identify chemical concentrations in soil that have the potential to contaminate groundwater. Migration of contaminants from soil to groundwater can be envisioned as a two-stage process: (1) release of contaminant in soil leachate and (2) transport of the contaminant through the underlying soil and aquifer to a receptor well. The SSL methodology considers both of these fate and transport mechanisms.

SSLs are backcalculated from acceptable ground water concentrations (i.e. nonzero MCLGs, MCLs, or risk-based PRGs). First, the acceptable groundwater concentration is multiplied by a dilution factor to obtain a target leachate concentration. For example, if the dilution factor is 10 and the acceptable ground water concentration is 0.05 mg/L, the target soil leachate concentration would be 0.5 mg/L. The partition equation (presented in the *Soil Screening Guidance* document) is then used to calculate the total soil concentration (i.e. SSL) corresponding to this soil leachate concentration.

The SSL methodology was designed for use during the early stages of a site evaluation when information about subsurface conditions may be limited. Because of this constraint, the methodology is based on conservative, simplifying assumptions about the release and transport of contaminants in the subsurface. For more on SSLs, and how to calculate site-specific SSLs versus generic SSLs presented in the PRG table, the reader is referred to the *Soil Screening Guidance* document (USEPA 1996a,b).

4.5 Soil Saturation Limit

The soil saturation concentration "sat" corresponds to the contaminant concentration in soil at which the absorptive limits of the soil particles, the solubility limits of the soil pore water, and saturation of soil pore air have been reached. Above this concentration, the soil contaminant may be present in free phase, i.e., nonaqueous phase liquids (NAPLs) for contaminants that are liquid at ambient soil temperatures and pure solid phases for compounds that are solid at ambient soil temperatures.

Equation 4-10 is used to calculate "sat" for each volatile contaminant. As an update to RAGS HHEM, Part B (USEPA 1991a), this equation takes into account the amount of contaminant that is in the vapor phase in soil in addition to the amount dissolved in the soil's pore water and sorbed to soil particles.

Chemical-specific "sat" concentrations must be compared with each VF-based PRG because a basic principle of the PRG volatilization model is not applicable when free-phase contaminants are present. How these cases are handled depends on whether the contaminant is liquid or solid at ambient

temperatures. Liquid contaminant that have a VF-based PRG that exceeds the "sat" concentration are set equal to "sat" whereas for solids (e.g., PAHs), soil screening decisions are based on the appropriate PRGs for other pathways of concern at the site (e.g., ingestion).

4.6 Tap Water - Ingestion and Inhalation

Calculation of PRGs for ingestion and inhalation of contaminants in domestic water is based on the methodology presented in RAGS HHEM, Part B (USEPA 1991a). Ingestion of drinking water is an appropriate pathway for all chemicals. For the purposes of this guidance, however, inhalation of volatile chemicals from water is considered routinely only for chemicals with a Henry's Law constant of 1 x 10^{-5} atm-m^3/mole or greater and with a molecular weight of less than 200 g/mole.

For volatile chemicals, an upperbound volatilization constant (VF_w) is used that is based on all uses of household water (e.g showering, laundering, and dish washing). Certain assumptions were made. For example, it is assumed that the volume of water used in a residence for a family of four is 720 L/day, the volume of the dwelling is 150,000 L and the air exchange rate is 0.25 air changes/hour (Andelman in RAGS Part B). Furthermore, it is assumed that the average transfer efficiency weighted by water use is 50 percent (i.e. half of the concentration of each chemical in water will be transferred into air by all water uses). Note: the range of transfer efficiencies extends from 30% for toilets to 90% for dishwashers.

4.7 Default Exposure Factors

Default exposure factors were obtained primarily from RAGS Supplemental Guidance Standard Default *Exposure Factors* (OSWER Directive, 9285.6-03) dated March 25, 1991 and more recent information from U.S. EPA's Office of Solid Waste and Emergency Response, U.S. EPA's Office of Research and Development, and California EPA's Department of Toxic Substances Control (see Exhibit 4-1).

Because contact rates may be different for children and adults, carcinogenic risks during the first 30 years of life were calculated using age-adjusted factors ("adj"). Use of age-adjusted factors are especially important for soil ingestion exposures, which are higher during childhood and decrease with age. However, for purposes of combining exposures across pathways, additional age-adjusted factors are used for inhalation and dermal exposures. These factors approximate the integrated exposure from birth until age 30 combining contact rates, body weights, and exposure durations for two age groups - small children and adults. Age-adjusted factors were obtained from RAGS PART B or developed by analogy (see derivations next page).

For soils only, noncarcinogenic contaminants are evaluated in children separately from adults. No age-adjustment factor is used in this case. The focus on children is considered protective of the higher daily intake rates of soil by children and their lower body weight. For maintaining consistency when evaluating soils, dermal and inhalation exposures are also based on childhood contact rates.

(1) ingestion([mg-yr]/[kg-d]:

$$IFS_{adj} = \frac{ED_c \times IRS_c}{BW_c} + \frac{(ED_r - ED_c) \times IRS_a}{BW_a}$$

(2) skin contact([mg-yr]/[kg-d]:

$$SFS_{adj} = \frac{ED_c \times AF \times SA_c}{BW_c} + \frac{(ED_r - ED_c) \times AF \times SA_a}{BW_a}$$

(3) inhalation ([m^3-yr]/[kg-d]):

$$InhF_{adj} = \frac{ED_c \times IRA_c}{BW_c} + \frac{(ED_r - ED_c) \times IRA_a}{BW_a}$$

EXHIBIT 4-1
STANDARD DEFAULT FACTORS

Symbol	Definition (units)	Default	Reference
CSFo	Cancer slope factor oral (mg/kg-d)-1	--	IRIS, HEAST, or NCEA
CSFi	Cancer slope factor inhaled (mg/kg-d)-1	--	IRIS, HEAST, or NCEA
RfDo	Reference dose oral (mg/kg-d)	--	IRIS, HEAST, or NCEA
RfDi	Reference dose inhaled (mg/kg-d)	--	IRIS, HEAST, or NCEA
TR	Target cancer risk	10^{-6}	--
THQ	Target hazard quotient	1	--
BWa	Body weight, adult (kg)	70	RAGS (Part A), EPA 1989 (EPA/540/1-89/002)
BWc	Body weight, child (kg)	15	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
ATc	Averaging time - carcinogens (days)	25550	RAGS(Part A), EPA 1989 (EPA/540/1-89/002)
ATn	Averaging time - noncarcinogens (days)	ED*365	
SAa	Exposed surface area for soil/dust (cm^2/day)		Dermal Assessment, EPA 2000 (EPA/540/R-99/005)
	– adult resident	5700	
	– adult worker	3300	
SAc	Exposed surface area, child in soil (cm^2/day)	2800	Dermal Assessment, EPA 2000 (EPA/540/R-99/005)
AFa	Adherence factor, soils (mg/cm^2)		Dermal Assessment, EPA 2000 (EPA/540/R-99/005)
	– adult resident	0.07	
	– adult worker	0.2	
AFc	Adherence factor, child (mg/cm^2)	0.2	Dermal Assessment, EPA 2000 (EPA/540/R-99/005)
ABS	Skin absorption defaults (unitless):		
	– semi-volatile organics	0.1	Dermal Assessment, EPA 2000 (EPA/540/R-99/005)
	– volatile organics	--	Dermal Assessment, EPA 2000 (EPA/540/R-99/005)
	– inorganics	--	Dermal Assessment, EPA 2000 (EPA/540/R-99/005)
IRAa	Inhalation rate - adult (m^3/day)	20	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
IRAc	Inhalation rate - child (m^3/day)	10	Exposure Factors, EPA 1997 (EPA/600/P-95/002Fa)
IRWa	Drinking water ingestion - adult (L/day	2	RAGS(Part A), EPA 1989 (EPA/540/1-89/002)
IRWc	Drinking water ingestion - child (L/day)	1	PEA, Cal-EPA (DTSC, 1994)
IRSa	Soil ingestion - adult (mg/day)	100	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
IRSc	Soil ingestion - child (mg/day),	200	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
IRSo	Soil ingestion - occupational (mg/day)	100	Soil Screening Guidance (EPA 2001a)
EFr	Exposure frequency - residential (d/y)	350	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
EFo	Exposure frequency - occupational (d/y)	250	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
EDr	Exposure duration - residential (years)	30[a]	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
EDc	Exposure duration - child (years)	6	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
EDo	Exposure duration - occupational (years)	25	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
	Age-adjusted factors for carcinogens:		
IFSadj	Ingestion factor, soils ([mg-yr]/[kg-d])	114	RAGS(Part B), EPA 1991 (OSWER No. 9285.7-01B)
SFSadj	Dermal factor, soils ([mg-yr]/[kg-d])	361	By analogy to RAGS (Part B)
InhFadj	Inhalation factor, air ([m^3-yr]/[kg-d])	11	By analogy to RAGS (Part B)
IFWadj	Ingestion factor, water ([L-yr]/[kg-d])	1.1	By analogy to RAGS (Part B)
VFw	Volatilization factor for water (L/m^3)	0.5	RAGS(Part B), EPA 1991 (OSWER No. 9285.7-01B)
PEF	Particulate emission factor (m^3/kg)	See below	Soil Screening Guidance (EPA 1996a,b)
VFs	Volatilization factor for soil (m^3/kg)	See below	Soil Screening Guidance (EPA 1996a,b)
sat	Soil saturation concentration (mg/kg)	See below	Soil Screening Guidance (EPA 1996a,b)

Footnote:
[a]Exposure duration for lifetime residents is assumed to be 30 years total. For carcinogens, exposures are combined for children (6 years) and adults (24 years).

4.8 Standardized Equations

The equations used to calculate the PRGs for carcinogenic and noncarcinogenic contaminants are presented in Equations 4-1 through 4-8. The PRG equations update RAGS Part B equations. The methodology backcalculates a soil, air, or water concentration level from a target risk (for carcinogens) or hazard quotient (for noncarcinogens). For completeness, the soil equations combine risks from ingestion, skin contact, and inhalation simultaneously. **Note: the electronic version of the table also includes pathway-specific PRGs, should the user decide against combining specific exposure pathways; or, the user wants to identify the relative contribution of each pathway to exposure.**

To calculate PRGs for volatile chemicals in soil, a chemical-specific volatilization factor is calculated per Equation 4-9. Because of its reliance on Henry's law, the VF_s model is applicable only when the contaminant concentration in soil is at or below saturation (i.e. there is no free-phase contaminant present). Soil saturation ("sat") corresponds to the contaminant concentration in soil at which the adsorptive limits of the soil particles and the solubility limits of the available soil moisture have been reached. Above this point, pure liquid-phase contaminant is expected in the soil. If the PRG calculated using VF_s was greater than the calculated sat, the PRG was set equal to sat, in accordance with *Soil Screening Guidance* (USEPA 1996 a,b). The equation for deriving sat is presented in Equation 4-10.

PRG EQUATIONS

Soil Equations: For soils, equations were based on three exposure routes (ingestion, skin contact, and inhalation).

Equation 4-1: Combined Exposures to Carcinogenic Contaminants in Residential Soil

$$C(mg/kg) = \frac{TR \times AT_c}{EF_r \left[\left(\frac{IFS_{adj} \times CSF_o}{10^6 mg/kg} \right) + \left(\frac{SFS_{adj} \times ABS \times CSF_o}{10^6 mg/kg} \right) + \left(\frac{InhF_{adj} \times CSF_i}{VF_s^a} \right) \right]}$$

Equation 4-2: Combined Exposures to Noncarcinogenic Contaminants in Residential Soil

$$C(mg/kg) = \frac{THQ \times BW_c \times AT_n}{EF_r \times ED_c \left[\left(\frac{1}{RfD_o} \times \frac{IRS_c}{10^6 mg/kg} \right) + \left(\frac{1}{RfD_o} \times \frac{SA_c \times AF \times ABS}{10^6 mg/kg} \right) + \left(\frac{1}{RfD_i} \times \frac{IRA_c}{VF_s^a} \right) \right]}$$

Equation 4-3: Combined Exposures to Carcinogenic Contaminants in Industrial Soil

$$C(mg/kg) = \frac{TR \times BW_a \times AT_c}{EF_o \times ED_o \left[\left(\frac{IRS_o \times CSF_o}{10^6 mg/kg} \right) + \left(\frac{SA_a \times AF \times ABS \times CSF_o}{10^6 mg/kg} \right) + \left(\frac{IRA_a \times CSF_i}{VF_s^a} \right) \right]}$$

Footnote:

[a]Use VF_s for volatile chemicals (defined as having a Henry's Law Constant [atm-m^3/mol] greater than 10^{-5} and a molecular weight less than 200 grams/mol) or PEF for non-volatile chemicals.

Equation 4-4: Combined Exposures to Noncarcinogenic Contaminants in Industrial Soil

$$C(mg/kg) = \frac{THQ \times BW_a \times AT_n}{EF_o \times ED_o[(\frac{1}{RfD_o} \times \frac{IRS_o}{10^6 mg/kg}) + (\frac{1}{RfD_o} \times \frac{SA_a \times AF \times ABS}{10^6 mg/kg}) + (\frac{1}{RfD_i} \times \frac{IRA_a}{VF_s^a})]}$$

Tap Water Equations:

Equation 4-5: Ingestion and Inhalation Exposures to Carcinogenic Contaminants in Water

$$C(ug/L) = \frac{TR \times AT_c \times 1000ug/mg}{EF_r\ [(IFW_{adj} \times CSF_o) + (VF_w \times InhF_{adj} \times CSF_i)]}$$

Equation 4-6: Ingestion and Inhalation Exposures to Noncarcinogenic Contaminants in Water

$$C(ug/L) = \frac{THQ \times BW_a \times AT_n \times 1000ug/mg}{EF_r \times ED_r\ [(\frac{IRW_a}{RfD_o}) + (\frac{VF_w \times IRA_a}{RfD_i})]}$$

Air Equations:

Equation 4-7: Inhalation Exposures to Carcinogenic Contaminants in Air

$$C(ug/m^3) = \frac{TR \times AT_c \times 1000ug/mg}{EF_r \times InhF_{adj} \times CSF_i}$$

Equation 4-8: Inhalation Exposures to Noncarcinogenic Contaminants in Air

$$C(ug/m^3) = \frac{THQ \times RfD_i \times BW_a \times AT_n \times 1000ug/mg}{EF_r \times ED_r \times IRA_a}$$

Footnote:
[a]Use VF_s for volatile chemicals (defined as having a Henry's Law Constant [atm-m^3/mol] greater than 10^{-5} and a molecular weight less than 200 grams/mol) or PEF for non-volatile chemicals.

SOIL-TO-AIR VOLATILIZATION FACTOR (VF_s)

Equation 4-9: Derivation of the Volatilization Factor

$$VF_s\,(m^3/kg) = (Q/C) \times \frac{(3.14 \times D_A \times T)^{1/2}}{(2 \times \rho_b \times D_A)} \times 10^{-4}\,(m^2/cm^2)$$

where:

$$D_A = \frac{[\,(\Theta_a^{10/3} D_i H' + \Theta_w^{10/3} D_w)\,/n^2\,]}{\rho_B K_d + \Theta_w + \Theta_a H'}$$

Parameter	Definition (units)	Default
VF_s	Volatilization factor (m^3/kg)	--
D_A	Apparent diffusivity (cm^2/s)	--
Q/C	Inverse of the mean conc. at the center of a 0.5-acre square source ($g/^{M2}$-s per kg/m^3)	68.81
T	Exposure interval (s)	9.5×10^8
ρ_b	Dry soil bulk density (g/cm^3)	1.5
Θ_a	Air filled soil porosity (L_{air}/L_{soil})	0.28 or n-Θ_w
n	Total soil porosity (L_{pore}/L_{soil})	0.43 or 1 - (ρ_b/ρ_s)
Θ_w	Water-filled soil porosity (L_{water}/L_{soil})	0.15
ρ_s	Soil particle density (g/cm^3)	2.65
Di	Diffusivity in air (cm^2/s)	Chemical-specific
H	Henry's Law constant (atm-m^3/mol)	Chemical-specific
H'	Dimensionless Henry's Law constant	Calculated from H by multiplying by 41 (USEPA 1991a)
D_w	Diffusivity in water (cm^2/s)	Chemical-specific
K_d	Soil-water partition coefficient (cm^3/g) = $K_{oc}f_{oc}$	Chemical-specific
K_{oc}	Soil organic carbon-water partition coefficient (cm^3/g)	Chemical-specific
f_{oc}	Fraction organic carbon in soil (g/g)	0.006 (0.6%)

SOIL SATURATION CONCENTRATION (sat)

Equation 4-10: Derivation of the Soil Saturation Limit

$$sat = \frac{S}{\rho_b} (K_d \rho_b + \Theta_w + H' \Theta_a)$$

Parameter	Definition (units)	Default
sat	Soil saturation concentration (mg/kg)	--
S	Solubility in water (mg/L-water)	Chemical-specific
ρ_b	Dry soil bulk density (kg/L)	1.5
n	Total soil porosity (L_{pore}/L_{soil})	0.43 or 1 - (ρ_b/ρ_s)
ρ_s	Soil particle density (kg/L)	2.65
K_d	Soil-water partition coefficient (L/kg)	K_{oc} x f_{oc} (chemical-specific)
k_{oc}	Soil organic carbon/water partition coefficient (L/kg)	Chemical-specific
f_{oc}	Fraction organic carbon content of soil (g/g)	0.006 or site-specific
Θ_w	Water-filled soil porosity (L_{water}/L_{soil})	0.15
Θ_a	Air filled soil porosity (L_{air}/L_{soil})	0.28 or n-Θ_w
w	Average soil moisture content (kg_{water}/kg_{soil} or L_{water}/kg_{soil})	0.1
H	Henry's Law constant (atm-m^3/mol)	Chemical-specific
H'	Dimensionless Henry's Law constant	H x 41, where 41 is a units conversion factor

SOIL-TO-AIR PARTICULATE EMISSION FACTOR (PEF)

Equation 4-11: Derivation of the Particulate Emission Factor

$$PEF(m^3/kg) = Q/C \times \frac{3600 s/h}{0.036 \times (1-V) \times (U_m/U_t)^3 \times F(x)}$$

Parameter	Definition (units)	Default
PEF	Particulate emission factor (m^3/kg)	1.316×10^9
Q/C	Inverse of the mean concentration at the center of a 0.5-acre-square source ($g/^{M2}$-s per kg/m^3)	90.80
V	Fraction of vegetative cover (unitless)	0.5
U_m	Mean annual windspeed (m/s)	4.69
U_t	Equivalent threshold value of windspeed at 7 m (m/s)	11.32
F(x)	Function dependent on U_m/U_t derived using Cowherd (1985) (unitless)	0.194

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Key : SFo,I=Cancer Slope Factor oral, inhalation RfDo,I=Reference Dose oral, inhalation I=IRIS h=HEAST n=NCEA x=Withdrawn o=Other EPA Source r=Route-extrapolation ca=Cancer PRG nc=Noncancer PRG ca* (where: nc < 100X ca) ca**(where: nc < 10X ca)
+++=Non-Standard Method Applied (See Section 2.3 of the "Region 9 PRGs Table User's Guide") sat=Soil Saturation (See Section 4.5) max=Ceiling limit (See Section 2.1) DAF=Dilution Attenuation Factor (See Section 2.5) CAS=Chemical Abstract Services

TOXICITY INFORMATION									CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs) "Direct Contact Exposure Pathways"								SOIL SCREENING LEVELS "Migration to Ground Water"	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		V O C / skin abs. soils / CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
8.7E-03	i	4.0E-03	i	8.7E-03	r	4.0E-03	r	0 / 0.10 / 30560-19-1	Acephate	5.6E+01	ca**	2.0E+02	ca*	7.7E-01	ca*	7.7E+00	ca*		
				7.7E-03	i	2.6E-03	i	1 / / 75-07-0	Acetaldehyde	1.1E+01	ca**	2.3E+01	ca**	8.7E-01	ca*	1.7E+00	ca		
		2.0E-02	i			2.0E-02	r	0 / 0.10 / 34256-82-1	Acetochlor	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
		1.0E-01	i			1.0E-01	r	1 / / 67-64-1	Acetone	1.6E+03	nc	6.0E+03	nc	3.7E+02	nc	6.1E+02	nc	1.6E+01	8.0E-01
		8.0E-04	h			8.0E-04	r	0 / 0.10 / 75-86-5	Acetone cyanohydrin	4.9E+01	nc	4.9E+02	nc	2.9E+00	nc	2.9E+01	nc		
		1.7E-02	r			1.7E-02	i	1 / / 75-05-8	Acetonitrile	4.2E+02	nc	1.8E+03	nc	6.2E+01	nc	1.0E+02	nc		
		2.0E-02	h			5.7E-06	i	1 / / 107-02-8	Acrolein	1.0E-01	nc	3.4E-01	nc	2.1E-02	nc	4.2E-02	nc		
4.5E+00	i	2.0E-04	i	4.5E+00	i	2.0E-04	r	0 / 0.10 / 79-06-1	Acrylamide	1.1E-01	ca	3.8E-01	ca	1.5E-03	ca	1.5E-02	ca		
		5.0E-01	i			2.9E-04	i	0 / 0.10 / 79-10-7	Acrylic acid	2.9E+04	nc	1.0E+05	max	1.0E+00	nc	1.8E+04	nc		
5.4E-01	i	1.0E-03	h	2.4E-01	i	5.7E-04	i	1 / / 107-13-1	Acrylonitrile	2.1E-01	ca*	4.9E-01	ca*	2.8E-02	ca*	3.9E-02	ca*		
8.1E-02	h	1.0E-02	i	8.0E-02	r	1.0E-02	r	0 / 0.10 / 15972-60-8	Alachlor	6.0E+00	ca	2.1E+01	ca	8.4E-02	ca	8.4E-01	ca		
		1.5E-01	i			1.5E-01	r	0 / 0.10 / 1596-84-5	Alar	9.2E+03	nc	9.2E+04	nc	5.5E+02	nc	5.5E+03	nc		
		1.0E-03	i			1.0E-03	r	0 / 0.10 / 116-06-3	Aldicarb	6.1E+01	nc	6.2E+02	nc	3.7E+00	nc	3.6E+01	nc		
		1.0E-03	i			1.0E-03	r	0 / 0.10 / 1646-88-4	Aldicarb sulfone	6.1E+01	nc	6.2E+02	nc	3.7E+00	nc	3.6E+01	nc		
1.7E+01	i	3.0E-05	i	1.7E+01	i	3.0E-05	r	0 / 0.10 / 309-00-2	Aldrin	2.9E-02	ca*	1.0E-01	ca	3.9E-04	ca	4.0E-03	ca	5.0E-01	2.0E-02
		2.5E-01	i			2.5E-01	r	0 / 0.10 / 74223-64-6	Ally	1.5E+04	nc	1.0E+05	max	9.1E+02	nc	9.1E+03	nc		
		5.0E-03	i			5.0E-03	r	0 / 0.10 / 107-18-6	Allyl alcohol	3.1E+02	nc	3.1E+03	nc	1.8E+01	nc	1.8E+02	nc		
		5.0E-02	h			2.9E-04	i	0 / 0.10 / 107-05-1	Allyl chloride	3.0E+03	nc	3.0E+04	nc	1.0E+00	nc	1.8E+03	nc		
		1.0E+00	n			1.4E-03	n	0 / / 7429-90-5	Aluminum	7.6E+04	nc	1.0E+05	max	5.1E+00	nc	3.6E+04	nc		
		4.0E-04	i					0 / / 20859-73-8	Aluminum phosphide	3.1E+01	nc	4.1E+02	nc			1.5E+01	nc		
		3.0E-04	i			3.0E-04	r	0 / 0.10 / 67485-29-4	Amdro	1.8E+01	nc	1.8E+02	nc	1.1E+00	nc	1.1E+01	nc		
		9.0E-03	i			9.0E-03	r	0 / 0.10 / 834-12-8	Ametryn	5.5E+02	nc	5.5E+03	nc	3.3E+01	nc	3.3E+02	nc		
		7.0E-02	h			7.0E-02	r	0 / 0.10 / 591-27-5	m-Aminophenol	4.3E+03	nc	4.3E+04	nc	2.6E+02	nc	2.6E+03	nc		
		2.0E-05	h			2.0E-05	r	0 / 0.10 / 504-24-5	4-Aminopyridine	1.2E+00	nc	1.2E+01	nc	7.3E-02	nc	7.3E-01	nc		
		2.5E-03	i			2.5E-03	r	0 / 0.10 / 33089-61-1	Amitraz	1.5E+02	nc	1.5E+03	nc	9.1E+00	nc	9.1E+01	nc		
						2.9E-02	I	/ / 7664-41-7	Ammonia					1.0E+02	nc				
		2.0E-01	i					0 / 0.10 / 7773-06-0	Ammonium sulfamate	1.2E+04	nc	1.0E+05	max			7.3E+03	nc		
5.7E-03	i	7.0E-03	n	5.7E-03	r	2.9E-04	i	0 / 0.10 / 62-53-3	Aniline	8.5E+01	ca**	3.0E+02	ca*	1.0E+00	nc	1.2E+01	ca*		
		4.0E-04	i					0 / / 7440-36-0	Antimony and compounds	3.1E+01	nc	4.1E+02	nc			1.5E+01	nc	5.0E+00	3.0E-01
		5.0E-04	h					0 / / 1314-60-9	Antimony pentoxide	3.9E+01	nc	5.1E+02	nc			1.8E+01	nc		
		9.0E-04	h					0 / / 28300-74-5	Antimony potassium tartrate	7.0E+01	nc	9.2E+02	nc			3.3E+01	nc		
		4.0E-04	h					0 / / 1332-81-6	Antimony tetroxide	3.1E+01	nc	4.1E+02	nc			1.5E+01	nc		
		4.0E-04	h			5.7E-05	i	0 / / 1309-64-4	Antimony trioxide	3.1E+01	nc	4.1E+02	nc	2.1E-01	nc	1.5E+01	nc		
		1.3E-02	i			1.3E-02	r	0 / 0.10 / 74115-24-5	Apollo	7.9E+02	nc	8.0E+03	nc	4.7E+01	nc	4.7E+02	nc		
2.5E-02	i	5.0E-02	h	2.5E-02	i	5.0E-02	r	0 / 0.10 / 140-57-8	Aramite	1.9E+01	ca	6.9E+01	ca	2.7E-01	ca	2.7E+00	ca		
		3.0E-04	I					0 / 0.03 / 7440-38-2	Arsenic (noncancer endpoint)	2.2E+01	nc	2.6E+02	nc						

Key : SFo,i=Cancer Slope Factor oral, inhalation RfDo,i=Reference Dose oral, inhalation I=IRIS h=HEAST n=NCEA x=Withdrawn o=Other EPA Source r=Route-extrapolation ca=Cancer PRG nc=Noncancer PRG ca* (where: nc < 100X ca) ca**(where: nc < 10X ca)
+++=Non-Standard Method Applied (See Section 2.3 of the "Region 9 PRGs Table User's Guide") sat=Soil Saturation (See Section 4.5) max=Ceiling limit (See Section 2.1) DAF=Dilution Attenuation Factor (See Section 2.5) CAS=Chemical Abstract Services

TOXICITY INFORMATION										CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs) "Direct Contact Exposure Pathways"								SOIL SCREENING LEVELS "Migration to Ground Water"	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
1.5E+00	i	3.0E-04	i	1.5E+01	i			0	0.03	7440-38-2	Arsenic (cancer endpoint)	3.9E-01	ca*	1.6E+00	ca	4.5E-04	ca	4.5E-02	ca	2.9E+01	1.0E+00
						1.4E-05	i	0		7784-42-1	Arsine (see arsenic for cancer endpoint)					5.2E-02	nc				
		9.0E-03	i			9.0E-03	r		0.10	76578-12-6	Assure	5.5E+02	nc	5.5E+03	nc	3.3E+01	nc	3.3E+02	nc		
		5.0E-02	i			5.0E-02	r	0	0.10	3337-71-1	Asulam	3.1E+03	nc	3.1E+04	nc	1.8E+02	nc	1.8E+03	nc		
2.2E-01	h	3.5E-02	h	2.2E-01	r	3.5E-02	r	0	0.10	1912-24-9	Atrazine	2.2E+00	ca	7.8E+00	ca	3.1E-02	ca	3.0E-01	ca		
		4.0E-04	I			4.0E-04	r	0	0.10	71751-41-2	Avermectin B1	2.4E+01	nc	2.5E+02	nc	1.5E+00	nc	1.5E+01	nc		
1.1E-01	I			1.1E-01	i			0	0.10	103-33-3	Azobenzene	4.4E+00	ca	1.6E+01	ca	6.2E-02	ca	6.1E-01	ca		
		7.0E-02	I			1.4E-04	h	0		7440-39-3	Barium and compounds	5.4E+03	nc	6.7E+04	nc	5.2E-01	nc	2.6E+03	nc	1.6E+03	8.2E+01
		4.0E-03	I			4.0E-03	r	0	0.10	114-26-1	Baygon	2.4E+02	nc	2.5E+03	nc	1.5E+01	nc	1.5E+02	nc		
		3.0E-02	I			3.0E-02	r	0	0.10	43121-43-3	Bayleton	1.8E+03	nc	1.8E+04	nc	1.1E+02	nc	1.1E+03	nc		
		2.5E-02	I			2.5E-02	r	0	0.10	68359-37-5	Baythroid	1.5E+03	nc	1.5E+04	nc	9.1E+01	nc	9.1E+02	nc		
		3.0E-01	I			3.0E-01	r	0	0.10	1861-40-1	Benefin	1.8E+04	nc	1.0E+05	max	1.1E+03	nc	1.1E+04	nc		
		5.0E-02	I			5.0E-02	r	0	0.10	17804-35-2	Benomyl	3.1E+03	nc	3.1E+04	nc	1.8E+02	nc	1.8E+03	nc		
		3.0E-02	I			3.0E-02	r	0	0.10	25057-89-0	Bentazon	1.8E+03	nc	1.8E+04	nc	1.1E+02	nc	1.1E+03	nc		
		1.0E-01	I			1.0E-01	r	0	0.10	100-52-7	Benzaldehyde	6.1E+03	nc	6.2E+04	nc	3.7E+02	nc	3.6E+03	nc		
5.5E-02	i	3.0E-03	n	2.9E-02	i	1.7E-03	n	1		71-43-2	Benzene	6.0E-01	ca*	1.3E+00	ca*	2.3E-01	ca*	3.4E-01	ca*	3.0E-02	2.0E-03
2.3E+02	i	3.0E-03	I	2.3E+02	i	3.0E-03	r	0	0.10	92-87-5	Benzidine	2.1E-03	ca	7.5E-03	ca	2.9E-05	ca	2.9E-04	ca		
		4.0E+00	I			4.0E+00	r	0	0.10	65-85-0	Benzoic acid	1.0E+05	max	1.0E+05	max	1.5E+04	nc	1.5E+05	nc	4.0E+02	2.0E+01
1.3E+01	i			1.3E+01	r			0	0.10	98-07-7	Benzotrichloride	3.7E-02	ca	1.3E-01	ca	5.2E-04	ca	5.2E-03	ca		
		3.0E-01	h			3.0E-01	r	0	0.10	100-51-6	Benzyl alcohol	1.8E+04	nc	1.0E+05	max	1.1E+03	nc	1.1E+04	nc		
1.7E-01	i	2.9E-03	r	1.7E-01	r	2.9E-03	n	1		100-44-7	**Benzyl chloride**	8.9E-01	ca*	2.2E+00	ca	4.0E-02	ca	6.6E-02	ca		
		2.0E-03	i	8.4E+00	i	5.7E-06	i	0		7440-41-7	Beryllium and compounds	1.5E+02	nc	1.9E+03	ca**	8.0E-04	ca*	7.3E+01	nc	6.3E+01	3.0E+00
		1.0E-04	I			1.0E-04	r	0	0.10	141-66-2	Bidrin	6.1E+00	nc	6.2E+01	nc	3.7E-01	nc	3.6E+00	nc		
		1.5E-02	i			1.5E-02	r	0	0.10	82657-04-3	Biphenthrin (Talstar)	9.2E+02	nc	9.2E+03	nc	5.5E+01	nc	5.5E+02	nc		
		5.0E-02	i			5.0E-02	r	1		92-52-4	1,1-Biphenyl	3.5E+02	sat	3.5E+02	sat	1.8E+02	nc	3.0E+02	nc		
1.1E+00	i			1.2E+00	i			1		111-44-4	Bis(2-chloroethyl)ether	2.1E-01	ca	5.5E-01	ca	5.8E-03	ca	9.8E-03	ca	4.0E-04	2.0E-05
7.0E-02	x	4.0E-02	i	3.5E-02	x	4.0E-02	r	1		39638-32-9	Bis(2-chloroisopropyl)ether	2.9E+00	ca	7.4E+00	ca	1.9E-01	ca	2.7E-01	ca		
2.2E+02	i			2.2E+02	i			1		542-88-1	Bis(chloromethyl)ether	1.9E-04	ca	4.3E-04	ca	3.1E-05	ca	5.2E-05	ca		
7.0E-02	x	4.0E-02	i	3.5E-02	x	4.0E-02	r	1		108-60-1	Bis(2-chloro-1-methylethyl)ether	2.9E+00	ca	7.4E+00	ca	1.9E-01	ca	2.7E-01	ca		
1.4E-02	i	2.0E-02	i	1.4E-02	r	2.2E-02	r	0	0.10	117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)	3.5E+01	ca*	1.2E+02	ca	4.8E-01	ca	4.8E+00	ca		
		5.0E-02	I			5.0E-02	r	0	0.10	80-05-7	Bisphenol A	3.1E+03	nc	3.1E+04	nc	1.8E+02	nc	1.8E+03	nc		
		2.0E-01	i			5.7E-03	x	0		7440-42-8	**Boron**	1.6E+04	nc	1.0E+05	max	2.1E+01	nc	7.3E+03	nc		
						2.0E-04	h	0		7637-07-2	Boron trifluoride					7.3E-01	nc				
		4.00E-03	i							15541-45-4	**Bromate**	3.1E+02	nc	4.1E+03	nc	0.0E+00		1.5E+02	nc		
		2.0E-02	n			2.9E-03	n	1		108-86-1	Bromobenzene	2.8E+01	nc	9.2E+01	nc	1.0E+01	nc	2.0E+01	nc		
6.2E-02	i	2.0E-02	I	6.2E-02	r	2.0E-02	r	1		75-27-4	Bromodichloromethane	8.2E-01	ca	1.8E+00	ca	1.1E-01	ca	1.8E-01	ca	6.0E-01	3.0E-02

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+++=Non-Standard Method Applied (See Section 2.3 of the "Region 9 PRGs Table User's Guide") sat=Soil Saturation (See Section 4.5) max=Ceiling limit (See Section 2.1) DAF=Dilution Attenuation Factor (See Section 2.5) CAS=Chemical Abstract Services

TOXICITY INFORMATION									CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs) "Direct Contact Exposure Pathways"								SOIL SCREENING LEVELS "Migration to Ground Water"	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
7.9E-03	i	2.0E-02	I	3.9E-03	i	2.0E-02	r	0	0.10	75-25-2	Bromoform (tribromomethane)	6.2E+01	ca*	2.2E+02	ca*	1.7E+00	ca*	8.5E+00	ca*	8.0E-01	4.0E-02
		1.4E-03	I			1.4E-03	I	1		74-83-9	Bromomethane (Methyl bromide)	3.9E+00	nc	1.3E+01	nc	5.2E+00	nc	8.7E+00	nc	2.0E-01	1.0E-02
		5.0E-03	h			5.0E-03	r	0	0.10	2104-96-3	Bromophos	3.1E+02	nc	3.1E+03	nc	1.8E+01	nc	1.8E+02	nc		
		2.0E-02	I			2.0E-02	r	0	0.10	1689-84-5	Bromoxynil	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
		2.0E-02	I			2.0E-02	r	0	0.10	1689-99-2	Bromoxynil octanoate	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
9.8E-01	r			9.8E-01	i			1		106-99-0	**1,3-Butadiene**	6.5E-03	ca	1.4E-02	ca	6.9E-03	ca	1.1E-02	ca		
		1.0E-01	i			2.6E-03	n	0	0.10	71-36-3	**1-Butanol**	6.1E+03	nc	6.1E+04	nc	9.5E+00	nc	3.6E+03	nc	1.7E+01	9.0E-01
		5.0E-02	I			5.0E-02	r	0	0.10	2008-41-5	Butylate	3.1E+03	nc	3.1E+04	nc	1.8E+02	nc	1.8E+03	nc		
		4.00E-02	n			4.00E-02	r	1		104-51-8	**n-Butylbenzene**	2.4E+02	sat	2.4E+02	sat	1.5E+02	nc	2.4E+02	nc		
		4.00E-02	n			4.00E-02	r	1		135-9-88	**sec-Butylbenzene**	2.2E+02	sat	2.2E+02	sat	1.5E+02	nc	2.4E+02	nc		
		4.00E-02	n			4.00E-02	r	1		98-06-6	**tert-Butylbenzene**	3.9E+02	sat	3.9E+02	sat	1.5E+02	nc	2.4E+02	nc		
		2.0E-01	I			2.0E-01	r	0	0.10	85-68-7	Butyl benzyl phthalate	1.2E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc	9.3E+02	8.1E+02
		1.0E+00	I			1.0E+00	r	0	0.10	85-70-1	Butylphthalyl butylglycolate	6.1E+04	nc	1.0E+05	max	3.7E+03	nc	3.6E+04	nc		
2.5E-01	h	3.0E-04	h	2.5E-01	r	3.0E-04	r	0	0.10	75-60-5	**Cacodylic acid**	1.9E+00	ca**	6.9E+00	ca*	2.7E-02	ca*	2.7E-01	ca*		
		5.0E-04	I	6.3E+00	I			0	0.001	7440-43-9	Cadmium and compounds	3.7E+01	nc	4.5E+02	nc	1.1E-03	ca	1.8E+01	nc	8.0E+00	4.0E-01
		5.0E-01	I			5.0E-01	r	0	0.10	105-60-2	Caprolactam	3.1E+04	nc	1.0E+05	max	1.8E+03	nc	1.8E+04	nc		
8.6E-03	h	2.0E-03	I	8.6E-03	r	2.0E-03	r	0	0.10	2425-06-1	Captafol	5.7E+01	ca**	2.0E+02	ca**	7.8E-01	ca**	7.8E+00	ca**		
3.5E-03	h	1.3E-01	I	3.5E-03	r	1.3E-01	r	0	0.10	133-06-2	Captan	1.4E+02	ca*	4.9E+02	ca	1.9E+00	ca	1.9E+01	ca		
		1.0E-01	I			1.1E-01	r	0	0.10	63-25-2	Carbaryl	6.1E+03	nc	6.2E+04	nc	4.0E+02	nc	3.6E+03	nc		
2.0E-02	h			2.0E-02	r			0	0.10	86-74-8	Carbazole	2.4E+01	ca	8.6E+01	ca	3.4E-01	ca	3.4E+00	ca	6.0E-01	3.0E-02
		5.0E-03	I			5.0E-03	r	0	0.10	1563-66-2	Carbofuran	3.1E+02	nc	3.1E+03	nc	1.8E+01	nc	1.8E+02	nc		
		1.0E-01	I			2.0E-01	I	1		75-15-0	Carbon disulfide	3.6E+02	nc	7.2E+02	sat	7.3E+02	nc	1.0E+03	nc	3.2E+01	2.0E+00
1.3E-01	I	7.0E-04	I	5.3E-02	I	7.0E-04	r	1		56-23-5	Carbon tetrachloride	2.5E-01	ca**	5.5E-01	ca*	1.3E-01	ca*	1.7E-01	ca*	7.0E-02	3.0E-03
		1.0E-02	I			1.0E-02	r	0	0.10	55285-14-8	Carbosulfan	6.1E+02	nc	6.2E+03	nc	3.7E+01	nc	3.6E+02	nc		
		1.0E-01	I			1.0E-01	r	0	0.10	5234-68-4	Carboxin	6.1E+03	nc	6.2E+04	nc	3.7E+02	nc	3.6E+03	nc		
		1.5E-02	I			1.5E-02	r	0	0.10	133-90-4	Chloramben	9.2E+02	nc	9.2E+03	nc	5.5E+01	nc	5.5E+02	nc		
4.0E-01	h			4.0E-01	r			0	0.10	118-75-2	Chloranil	1.2E+00	ca	4.3E+00	ca	1.7E-02	ca	1.7E-01	ca		
3.5E-01	I	5.0E-04	I	3.5E-01	I	2.0E-04	I	0	0.04	12789-03-6	Chlordane	1.6E+00	ca*	6.5E+00	ca*	1.9E-02	ca*	1.9E-01	ca*	1.0E+01	5.0E-01
		2.0E-02	I			2.0E-02	r	0	0.10	90982-32-4	Chlorimuron-ethyl	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
		1.0E-01	I			5.71E-05	n			7782-50-5	Chlorine					2.1E-01	nc				
						5.7E-05	I			10049-04-4	Chlorine dioxide					2.1E-01	nc				
		2.0E-03	h			2.0E-03	r	0	0.10	79-11-8	Chloroacetic acid	1.2E+02	nc	1.2E+03	nc	7.3E+00	nc	7.3E+01	nc		
		8.6E-06	r			8.6E-06	I	1		532-27-4	2-Chloroacetophenone	3.3E-02	nc	1.1E-01	nc	3.1E-02	nc	5.2E-02	nc		
		4.0E-03	I			4.0E-03	r	0	0.10	106-47-8	4-Chloroaniline	2.4E+02	nc	2.5E+03	nc	1.5E+01	nc	1.5E+02	nc	7.0E-01	3.0E-02
		2.0E-02	I			1.7E-02	n	1		108-90-7	Chlorobenzene	1.5E+02	nc	5.3E+02	nc	6.2E+01	nc	1.1E+02	nc	1.0E+00	7.0E-02

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+++=Non-Standard Method Applied (See Section 2.3 of the "Region 9 PRGs Table User's Guide") sat=Soil Saturation (See Section 4.5) max=Ceiling limit (See Section 2.1) DAF=Dilution Attenuation Factor (See Section 2.5) CAS=Chemical Abstract Services

TOXICITY INFORMATION											CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs) "Direct Contact Exposure Pathways"								SOIL SCREENING LEVELS "Migration to Ground Water"	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
2.7E-01	h	2.0E-02	i	2.7E-01	h	2.0E-02	r	0	0.10	510-15-6	Chlorobenzilate	1.8E+00	ca	6.4E+00	ca	2.5E-02	ca	2.5E-01	ca		
		2.0E-01	h			2.0E-01	r	0	0.10	74-11-3	p-Chlorobenzoic acid	1.2E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc		
		2.0E-02	h			2.0E-02	r	0	0.10	98-56-6	4-Chlorobenzotrifluoride	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
		2.0E-02	h			2.0E-03	h	1		126-99-8	2-Chloro-1,3-butadiene	3.6E+00	nc	1.2E+01	nc	7.3E+00	nc	1.4E+01	nc		
		4.0E-01	h			4.0E-01	r	1		109-69-3	1-Chlorobutane	4.8E+02	sat	4.8E+02	sat	1.5E+03	nc	2.4E+03	nc		
		1.4E+01	r			1.4E+01	i	1		75-68-3	1-Chloro-1,1-difluoroethane (HCFC-142b)	3.4E+02	sat	3.4E+02	sat	5.2E+04	nc	8.7E+04	nc		
		1.4E+01	r			1.4E+01	i	1		75-45-6	Chlorodifluoromethane	3.4E+02	sat	3.4E+02	sat	5.1E+04	nc	8.5E+04	nc		
2.9E-03	n	4.0E-01	n	2.9E-03	r	2.9E+00	i	1		75-00-3	Chloroethane	3.0E+00	ca	6.5E+00	ca	2.3E+00	ca	4.6E+00	ca		
		1.0E-02	i			8.6E-04	n	1		67-66-3	**Chloroform**	3.6E+00	ca/nc	1.2E+01	ca/nc	3.1E+00	ca/nc	6.2E+00	ca/nc	6.0E-01	3.0E-02
3.1E-02				1.9E-02				1			**Chloroform "CAL-Modified PRG"**	9.4E-01	ca	2.0E+00	ca	3.5E-01	ca	5.3E-01	ca		
1.3E-02	h			6.3E-03	h	8.6E-02	n	1		74-87-3	Chloromethane	1.2E+00	ca	2.6E+00	ca	1.1E+00	ca	1.5E+00	ca		
5.8E-01	h			5.8E-01	r			0	0.10	95-69-2	4-Chloro-2-methylaniline	8.4E-01	ca	3.0E+00	ca	1.2E-02	ca	1.2E-01	ca		
4.6E-01	h			4.6E-01	r			0	0.10	3165-93-3	4-Chloro-2-methylaniline hydrochloride	1.1E+00	ca	3.7E+00	ca	1.5E-02	ca	1.5E-01	ca		
		8.0E-02	i			8.0E-02	r	1		91-58-7	beta-Chloronaphthalene	4.9E+03	nc	2.3E+04	nc	2.9E+02	nc	4.9E+02	nc		
9.7E-03	h	1.0E-03	h	9.7E-03	r	2.0E-05	h	1		88-73-3	**o-Chloronitrobenzene**	1.4E+00	nc**	4.5E+00	nc**	7.3E-02	nc**	1.5E-01	nc**		
6.7E-03	h	1.0E-03	h	6.7E-03	r	1.7E-04	h	1		100-00-5	**p-Chloronitrobenzene**	1.0E+01	nc**	3.7E+01	nc**	6.2E-01	nc**	1.2E+00	nc**		
		5.0E-03	I			5.0E-03	r	1		95-57-8	2-Chlorophenol	6.3E+01	nc	2.4E+02	nc	1.8E+01	nc	3.0E+01	nc	4.0E+00	2.0E-01
		2.9E-02	r			2.9E-02	h	1		75-29-6	2-Chloropropane	1.7E+02	nc	5.9E+02	nc	1.0E+02	nc	1.7E+02	nc		
1.1E-02	h	1.5E-02	I	1.1E-02	r	1.5E-02	r	0	0.10	1897-45-6	Chlorothalonil	4.4E+01	ca*	1.6E+02	ca*	6.1E-01	ca*	6.1E+00	ca*		
		2.0E-02	i			2.0E-02	r	1		95-49-8	o-Chlorotoluene	1.6E+02	nc	5.6E+02	nc	7.3E+01	nc	1.2E+02	nc		
		2.0E-01	i			2.0E-01	r	0	0.10	101-21-3	Chlorpropham	1.2E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc		
		3.0E-03	i			3.0E-03	r	0	0.10	2921-88-2	Chlorpyrifos	1.8E+02	nc	1.8E+03	nc	1.1E+01	nc	1.1E+02	nc		
		1.0E-02	h			1.0E-02	r	0	0.10	5598-13-0	Chlorpyrifos-methyl	6.1E+02	nc	6.2E+03	nc	3.7E+01	nc	3.6E+02	nc		
		5.0E-02	i			5.0E-02	r	0	0.10	64902-72-3	Chlorsulfuron	3.1E+03	nc	3.1E+04	nc	1.8E+02	nc	1.8E+03	nc		
		8.0E-04	h			8.0E-04	r	0	0.10	60238-56-4	Chlorthiophos	4.9E+01	nc	4.9E+02	nc	2.9E+00	nc	2.9E+01	nc		
				4.2E+01	I			0			Total Chromium (1:6 ratio Cr VI:Cr III)+++	2.1E+02	ca	4.5E+02	ca	1.6E-04	ca			3.8E+01	2.0E+00
		1.5E+00	I							16065-83-1	Chromium III	1.0E+05	max	1.0E+05	max	0.0E+00		5.5E+04	nc		
		3.0E-03	i	2.9E+02	I	2.2E-06	I	0		18540-29-9	Chromium VI+++	3.0E+01	ca**	6.4E+01	ca	2.3E-05	ca	1.1E+02	nc	3.8E+01	2.0E+00
		2.00E-02	n	9.8E+00	n	5.7E-06	n			7440-48-4	**Cobalt**	9.0E+02	ca**	1.9E+03	ca*	6.9E-04	ca*	7.3E+02	nc		
				2.2E+00	i			0		8007-45-2	Coke Oven Emissions					3.1E-03	ca				
		4.00E-02	h					0		7440-50-8	Copper and compounds	3.1E+03	nc	4.1E+04	nc			1.5E+03	nc		
1.9E+00	h			1.9E+00	r			1		123-73-9	Crotonaldehyde	5.3E-03	ca	1.1E-02	ca	3.5E-03	ca	5.9E-03	ca		
		1.0E-01	i			1.1E-01	I	1		98-82-8	Cumene (isopropylbenzene)	5.7E+02	nc	2.0E+03	nc	4.0E+02	nc	6.6E+02	nc		
8.4E-01	h	2.0E-03	h	8.4E-01	r	2.0E-03	r	0	0.10	21725-46-2	Cyanazine	5.8E-01	ca	2.1E+00	ca	8.0E-03	ca	8.0E-02	ca		
		2.0E-02	i					0	0.10	57-12-5	Cyanide (free)	1.2E+03	nc	1.2E+04	nc			7.3E+02	nc		
		2.0E-02	i			8.6E-04	i	1		74-90-8	Cyanide (hydrogen)	1.1E+01	nc	3.5E+01	nc	3.1E+00	nc	6.2E+00	nc		

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TOXICITY INFORMATION									CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs) "Direct Contact Exposure Pathways"								SOIL SCREENING LEVELS "Migration to Ground Water"	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		V O C / skin abs. soils / CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
		4.0E-02	i			4.0E-02	r	1 / 460-19-5	Cyanogen	1.3E+02	nc	4.3E+02	nc	1.5E+02	nc	2.4E+02	nc		
		9.0E-02	i			9.0E-02	r	1 / 506-68-3	Cyanogen bromide	2.9E+02	nc	9.7E+02	nc	3.3E+02	nc	5.5E+02	nc		
		5.0E-02	i			5.0E-02	r	1 / 506-77-4	Cyanogen chloride	1.6E+02	nc	5.4E+02	nc	1.8E+02	nc	3.0E+02	nc		
		5.7E+00	r			5.7E+00	n	1 / 110-82-7	Cyclohexane	1.4E+02	sat	1.4E+02	sat	2.1E+04	nc	3.5E+04	nc		
		5.0E+00	i			5.0E+00	r	0 / 0.10 / 108-94-1	Cyclohexanone	1.0E+05	max	1.0E+05	max	1.8E+04	nc	1.8E+05	nc		
		2.0E-01	i			2.0E-01	r	0 / 0.10 / 108-91-8	Cyclohexylamine	1.2E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc		
		5.0E-03	i			5.0E-03	r	0 / 0.10 / 68085-85-8	Cyhalothrin/Karate	3.1E+02	nc	3.1E+03	nc	1.8E+01	nc	1.8E+02	nc		
		1.0E-02	i			1.0E-02	r	0 / 0.10 / 52315-07-8	Cypermethrin	6.1E+02	nc	6.2E+03	nc	3.7E+01	nc	3.6E+02	nc		
		7.5E-03	i			7.5E-03	r	0 / 0.10 / 66215-27-8	Cyromazine	4.6E+02	nc	4.6E+03	nc	2.7E+01	nc	2.7E+02	nc		
		1.0E-02	i			1.0E-02	r	0 / 0.10 / 1861-32-1	Dacthal	6.1E+02	nc	6.2E+03	nc	3.7E+01	nc	3.6E+02	nc		
		3.0E-02	i			3.0E-02	r	0 / 0.10 / 75-99-0	Dalapon	1.8E+03	nc	1.8E+04	nc	1.1E+02	nc	1.1E+03	nc		
		2.5E-02	i			2.5E-02	r	0 / 0.10 / 39515-41-8	Danitol	1.5E+03	nc	1.5E+04	nc	9.1E+01	nc	9.1E+02	nc		
2.4E-01	i			2.4E-01	r			0 / 0.03 / 72-54-8	DDD	2.4E+00	ca	1.0E+01	ca	2.8E-02	ca	2.8E-01	ca	1.6E+01	8.0E-01
3.4E-01	i			3.4E-01	r			0 / 0.03 / 72-55-9	DDE	1.7E+00	ca	7.0E+00	ca	2.0E-02	ca	2.0E-01	ca	5.4E+01	3.0E+00
3.4E-01	i	5.0E-04	i	3.4E-01	i	5.0E-04	r	0 / 0.03 / 50-29-3	DDT	1.7E+00	ca*	7.0E+00	ca*	2.0E-02	ca*	2.0E-01	ca*	3.2E+01	2.0E+00
		1.0E-02	i			1.0E-02	r	0 / 0.10 / 1163-19-5	Decabromodiphenyl ether	6.1E+02	nc	6.2E+03	nc	3.7E+01	nc	3.6E+02	nc		
		4.0E-05	i			4.0E-05	r	0 / 0.10 / 8065-48-3	Demeton	2.4E+00	nc	2.5E+01	nc	1.5E-01	nc	1.5E+00	nc		
6.1E-02	h			6.1E-02	r			0 / 0.10 / 2303-16-4	Diallate	8.0E+00	ca	2.8E+01	ca	1.1E-01	ca	1.1E+00	ca		
		9.0E-04	h			9.0E-04	r	0 / 0.10 / 333-41-5	Diazinon	5.5E+01	nc	5.5E+02	nc	3.3E+00	nc	3.3E+01	nc		
		4.0E-03	n			4.0E-03	r	1 / 132-64-9	Dibenzofuran	2.9E+02	nc	3.1E+03	nc	1.5E+01	nc	2.4E+01	nc		
		1.0E-02	i			1.0E-02	r	0 / 0.10 / 106-37-6	1,4-Dibromobenzene	6.1E+02	nc	6.2E+03	nc	3.7E+01	nc	3.6E+02	nc		
8.4E-02	i	2.0E-02	i	8.4E-02	r	2.0E-02	r	1 / 124-48-1	Dibromochloromethane	1.1E+00	ca	2.6E+00	ca	8.0E-02	ca	1.3E-01	ca	4.0E-01	2.0E-02
1.4E+00	h	5.7E-05	r	2.4E-03	x	5.7E-05	i	1 / 96-12-8	1,2-Dibromo-3-chloropropane	4.5E-01	ca**	2.0E+00	ca**	2.1E-01	nc	4.8E-02	ca**		
7.0E+00				7.0E+00				1 / 96-12-8	**"CAL-Modified PRG"**	1.9E-02	ca	4.6E-02	ca	9.6E-04	ca	1.6E-03	ca		
8.5E+01	i	5.7E-05	r	7.7E-01	i	5.7E-05	h	1 / 106-93-4	1,2-Dibromoethane	6.9E-03	ca	2.8E-02	ca*	8.7E-03	ca*	7.6E-04	ca		
		1.0E-01	i			1.0E-01	r	0 / 0.10 / 84-74-2	Dibutyl phthalate	6.1E+03	nc	6.2E+04	nc	3.7E+02	nc	3.6E+03	nc	2.3E+03	2.7E+02
		3.0E-02	i			3.0E-02	r	0 / 0.10 / 1918-00-9	Dicamba	1.8E+03	nc	1.8E+04	nc	1.1E+02	nc	1.1E+03	nc		
		9.0E-02	i			5.7E-02	h	1 / 95-50-1	1,2-Dichlorobenzene	3.7E+02	sat	3.7E+02	sat	2.1E+02	nc	3.7E+02	nc	1.7E+01	9.0E-01
		9.00E-04	n			9.00E-04	r	1 / 541-73-1	1,3-Dichlorobenzene	1.6E+01	nc	6.3E+01	nc	3.3E+00	nc	5.5E+00	nc		
2.4E-02	h	3.00E-02	n	2.2E-02	n	3.00E-02	i	1 / 106-46-7	1,4-Dichlorobenzene	3.4E+00	ca	7.9E+00	ca	3.1E-01	ca	5.0E-01	ca	2.0E+00	1.0E-01
4.5E-01	i			4.5E-01	r			0 / 0.10 / 91-94-1	3,3-Dichlorobenzidine	1.1E+00	ca	3.8E+00	ca	1.5E-02	ca	1.5E-01	ca	7.0E-03	3.0E-04
		3.00E-02	n			3.00E-02	r	0.10 / 90-98-2	4,4'-Dichlorobenzophenone	1.8E+03	nc	1.8E+04	nc	1.1E+02	nc	1.1E+03	nc		
9.3E+00	r			9.3E+00	h			1 / 764-41-0	1,4-Dichloro-2-butene	7.9E-03	ca	1.8E-02	ca	7.2E-04	ca	1.2E-03	ca		
		2.0E-01	i			5.7E-02	h	1 / 75-71-8	Dichlorodifluoromethane	9.4E+01	nc	3.1E+02	nc	2.1E+02	nc	3.9E+02	nc		
		1.0E-01	h			1.4E-01	h	1 / 75-34-3	1,1-Dichloroethane	5.1E+02	nc	1.7E+03	nc	5.2E+02	nc	8.1E+02	nc	2.3E+01	1.0E+00
5.7E-03				5.7E-03				1	"CAL-Modified PRG"	2.8E+00	ca	6.0E+00	ca	1.2E+00	ca	2.0E+00	ca		

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TOXICITY INFORMATION										CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs) "Direct Contact Exposure Pathways"								SOIL SCREENING LEVELS "Migration to Ground Water"	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
9.1E-02	i	3.0E-02	n	9.1E-02	i	1.4E-03	n	1		107-06-2	1,2-Dichloroethane (EDC)	2.8E-01	ca*	6.0E-01	ca*	7.4E-02	ca*	1.2E-01	ca*	2.0E-02	1.0E-03
		5.0E-02	i			5.7E-02	i	1		75-35-4	**1,1-Dichloroethylene**	1.2E+02	nc	4.1E+02	nc	2.1E+02	nc	3.4E+02	nc	6.0E-02	3.0E-03
		1.0E-02	h			1.0E-02	r	1		156-59-2	1,2-Dichloroethylene (cis)	4.3E+01	nc	1.5E+02	nc	3.7E+01	nc	6.1E+01	nc	4.0E-01	2.0E-02
		2.0E-02	i			2.0E-02	r	1		156-60-5	1,2-Dichloroethylene (trans)	6.9E+01	nc	2.3E+02	nc	7.3E+01	nc	1.2E+02	nc	7.0E-01	3.0E-02
		3.0E-03	i			3.0E-03	r	0	0.10	120-83-2	2,4-Dichlorophenol	1.8E+02	nc	1.8E+03	nc	1.1E+01	nc	1.1E+02	nc	1.0E+00	5.0E-02
		8.0E-03	i			8.0E-03	r	0	0.10	94-82-6	4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	4.9E+02	nc	4.9E+03	nc	2.9E+01	nc	2.9E+02	nc		
		1.0E-02	i			1.0E-02	r	0	0.05	94-75-7	2,4-Dichlorophenoxyacetic Acid (2,4-D)	6.9E+02	nc	7.7E+03	nc	3.7E+01	nc	3.6E+02	nc		
6.8E-02	h	1.1E-03	r	6.8E-02	r	1.1E-03	i	1		78-87-5	1,2-Dichloropropane	3.4E-01	ca*	7.4E-01	ca*	9.9E-02	ca*	1.6E-01	ca*	3.0E-02	1.0E-03
1.0E-01	i	3.00E-02	i	1.4E-02	i	5.7E-03	i	1		542-75-6	1,3-Dichloropropene	7.8E-01	ca	1.8E+00	ca	4.8E-01	ca	4.0E-01	ca	4.0E-03	2.0E-04
		3.0E-03	i			3.0E-03	r	0	0.10	616-23-9	2,3-Dichloropropanol	1.8E+02	nc	1.8E+03	nc	1.1E+01	nc	1.1E+02	nc		
2.9E-01	i	5.0E-04	i	2.9E-01	r	1.4E-04	i	0	0.10	62-73-7	Dichlorvos	1.7E+00	ca*	5.9E+00	ca*	2.3E-02	ca*	2.3E-01	ca*		
4.4E-01	x			4.4E-01	r			0	0.10	115-32-2	Dicofol	1.1E+00	ca	3.9E+00	ca	1.5E-02	ca	1.5E-01	ca		
		3.0E-02	h			5.7E-05	x	1		77-73-6	Dicyclopentadiene	5.4E-01	nc	1.8E+00	nc	2.1E-01	nc	4.2E-01	nc		
1.6E+01	i	5.0E-05	i	1.6E+01	i	5.0E-05	r	0	0.10	60-57-1	Dieldrin	3.0E-02	ca	1.1E-01	ca	4.2E-04	ca	4.2E-03	ca	4.0E-03	2.0E-04
		1.0E-02	h			5.7E-03	h	0	0.10	112-34-5	**Diethylene glycol, monobutyl ether**	6.1E+02	nc	6.2E+03	nc	2.1E+01	nc	3.6E+02	nc		
		6.0E-02	h			8.6E-04	h	0	0.10	111-90-0	**Diethylene glycol, monomethyl ether**	3.7E+03	nc	3.7E+04	nc	3.1E+00	nc	2.2E+03	nc		
		4.0E-03	h			4.0E-03	r	0	0.10	617-84-5	**Diethylformamide**	2.4E+02	nc	2.5E+03	nc	1.5E+01	nc	1.5E+02	nc		
1.2E-03	i	6.0E-01	i	1.2E-03	r	6.0E-01	r	0	0.10	103-23-1	Di(2-ethylhexyl)adipate	4.1E+02	ca	1.4E+03	ca	5.6E+00	ca	5.6E+01	ca		
		8.0E-01	i			8.0E-01	r	0	0.10	84-66-2	Diethyl phthalate	4.9E+04	nc	1.0E+05	max	2.9E+03	nc	2.9E+04	nc		
4.7E+03	h			4.7E+03	r			0	0.10	56-53-1	Diethylstilbestrol	1.0E-04	ca	3.7E-04	ca	1.4E-06	ca	1.4E-05	ca		
		8.0E-02	i			8.0E-02	r	0	0.10	43222-48-6	Difenzoquat (Avenge)	4.9E+03	nc	4.9E+04	nc	2.9E+02	nc	2.9E+03	nc		
		2.0E-02	i			2.0E-02	r	0	0.10	35367-38-5	Diflubenzuron	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
		1.1E+01	r			1.1E+01	i	1		75-37-6	1,1-Difluoroethane					4.2E+04	nc	6.9E+04	nc		
		2.00E-02	n			2.00E-02	r		0.10	28553-12-0	Diisononyl phthalate	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
		8.0E-02	i			8.0E-02	r	0	0.10	1445-75-6	Diisopropyl methylphosphonate	4.9E+03	nc	4.9E+04	nc	2.9E+02	nc	2.9E+03	nc		
		2.0E-02	i			2.0E-02	r	0	0.10	55290-64-7	Dimethipin	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
		2.0E-04	i			2.0E-04	r	0	0.10	60-51-5	Dimethoate	1.2E+01	nc	1.2E+02	nc	7.3E-01	nc	7.3E+00	nc		
1.4E-02	h			1.4E-02	r			0	0.10	119-90-4	3,3'-Dimethoxybenzidine	3.5E+01	ca	1.2E+02	ca	4.8E-01	ca	4.8E+00	ca		
		5.7E-06	r			5.7E-06	x	1		124-40-3	Dimethylamine	6.7E-02	nc	2.5E-01	nc	2.1E-02	nc	3.5E-02	nc		
		2.0E-03	i			2.0E-03	r	0	0.10	121-69-7	N-N-Dimethylaniline	1.2E+02	nc	1.2E+03	nc	7.3E+00	nc	7.3E+01	nc		
7.5E-01	h			7.5E-01	r			0	0.10	95-68-1	2,4-Dimethylaniline	6.5E-01	ca	2.3E+00	ca	9.0E-03	ca	9.0E-02	ca		
5.8E-01	h			5.8E-01	r			0	0.10	21436-96-4	2,4-Dimethylaniline hydrochloride	8.4E-01	ca	3.0E+00	ca	1.2E-02	ca	1.2E-01	ca		
9.2E+00	h			9.2E+00	r			0	0.10	119-93-7	3,3'-Dimethylbenzidine	5.3E-02	ca	1.9E-01	ca	7.3E-04	ca	7.3E-03	ca		
		1.0E-01	h			8.6E-03	i	0	0.10	68-12-2	N,N-Dimethylformamide	6.1E+03	nc	6.2E+04	nc	3.1E+01	nc	3.6E+03	nc		
		1.0E-03	n			1.0E-03	r	0	0.10	122-09-8	Dimethylphenethylamine	6.1E+01	nc	6.2E+02	nc	3.7E+00	nc	3.6E+01	nc		
		2.0E-02	i			2.0E-02	r	0	0.10	105-67-9	2,4-Dimethylphenol	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc	9.0E+00	4.0E-01

Key : SFo,i=Cancer Slope Factor oral, inhalation RfDo,i=Reference Dose oral, inhalation i=IRIS h=HEAST n=NCEA x=Withdrawn o=Other EPA Source r=Route-extrapolation ca=Cancer PRG nc=Noncancer PRG ca* (where: nc < 100X ca) ca**(where: nc < 10X ca)
+++=Non-Standard Method Applied (See Section 2.3 of the "Region 9 PRGs Table User's Guide") sat=Soil Saturation (See Section 4.5) max=Ceiling limit (See Section 2.1) DAF=Dilution Attenuation Factor (See Section 2.5) CAS=Chemical Abstract Services

TOXICITY INFORMATION									CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs) "Direct Contact Exposure Pathways"								SOIL SCREENING LEVELS "Migration to Ground Water"	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		V O C skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
		6.0E-04	i			6.0E-04	r	0 0.10	576-26-1	2,6-Dimethylphenol	3.7E+01	nc	3.7E+02	nc	2.2E+00	nc	2.2E+01	nc		
		1.0E-03	i			1.0E-03	r	0 0.10	95-65-8	3,4-Dimethylphenol	6.1E+01	nc	6.2E+02	nc	3.7E+00	nc	3.6E+01	nc		
		1.0E+01	h			1.0E+01	r	0 0.10	131-11-3	Dimethyl phthalate	1.0E+05	max	1.0E+05	max	3.7E+04	nc	3.6E+05	nc		
		1.0E-01	i			1.0E-01	r	0 0.10	120-61-6	Dimethyl terephthalate	6.1E+03	nc	6.2E+04	nc	3.7E+02	nc	3.6E+03	nc		
		2.0E-03	i			2.0E-03	r	0 0.10	131-89-5	4,6-Dinitro-o-cyclohexyl phenol	1.2E+02	nc	1.2E+03	nc	7.3E+00	nc	7.3E+01	nc		
		1.0E-04	h			1.0E-04	r	0 0.10	528-29-0	**1,2-Dinitrobenzene**	6.1E+00	nc	6.2E+01	nc	3.7E-01	nc	3.6E+00	nc		
		1.0E-04	i			1.0E-04	r	0 0.10	99-65-0	1,3-Dinitrobenzene	6.1E+00	nc	6.2E+01	nc	3.7E-01	nc	3.6E+00	nc		
		1.0E-04	h			1.0E-04	r	0 0.10	100-25-4	**1,4-Dinitrobenzene**	6.1E+00	nc	6.2E+01	nc	3.7E-01	nc	3.6E+00	nc		
		2.0E-03	i			2.0E-03	r	0 0.10	51-28-5	2,4-Dinitrophenol	1.2E+02	nc	1.2E+03	nc	7.3E+00	nc	7.3E+01	nc	3.0E-01	1.0E-02
6.8E-01	i			6.8E-01	r			0 0.10	25321-14-6	Dinitrotoluene mixture	7.2E-01	ca	2.5E+00	ca	9.9E-03	ca	9.9E-02	ca	8.0E-04	4.0E-05
		2.0E-03	i			2.0E-03	r	0 0.10	121-14-2	2,4-Dinitrotoluene (see DNT mixture for "ca")	1.2E+02	nc	1.2E+03	nc	7.3E+00	nc	7.3E+01	nc	8.0E-04	4.0E-05
		1.0E-03	h			1.0E-03	r	0 0.10	606-20-2	2,6-Dinitrotoluene (see DNT mixture for "ca")	6.1E+01	nc	6.2E+02	nc	3.7E+00	nc	3.6E+01	nc	7.0E-04	3.0E-05
		1.0E-03	i			1.0E-03	r	0 0.10	88-85-7	Dinoseb	6.1E+01	nc	6.2E+02	nc	3.7E+00	nc	3.6E+01	nc		
		4.0E-02	h			4.0E-02	r	0 0.10	117-84-0	**di-n-Octyl phthalate**	2.4E+03	nc	2.5E+04	nc	1.5E+02	nc	1.5E+03	nc	1.0E+04	1.0E+04
1.1E-02	i			1.1E-02	r			0 0.10	123-91-1	1,4-Dioxane	4.4E+01	ca	1.6E+02	ca	6.1E-01	ca	6.1E+00	ca		
1.5E+05	h			1.5E+05	h			0 0.03	1746-01-6	Dioxin (2,3,7,8-TCDD)	3.9E-06	ca	1.6E-05	ca	4.5E-08	ca	4.5E-07	ca		
		3.0E-02	i			3.0E-02	r	0 0.10	957-51-7	Diphenamid	1.8E+03	nc	1.8E+04	nc	1.1E+02	nc	1.1E+03	nc		
		2.5E-02	i			2.5E-02	r	0 0.10	122-39-4	Diphenylamine	1.5E+03	nc	1.5E+04	nc	9.1E+01	nc	9.1E+02	nc		
		3.00E-04	n			3.00E-04	r	0.10	74-31-7	N,N-Diphenyl-1,4 benzenediamine (DPPD)	1.8E+01	nc	1.8E+02	nc	1.1E+00	nc	1.1E+01	nc		
8.0E-01	i			7.7E-01	i			0 0.10	122-66-7	1,2-Diphenylhydrazine	6.1E-01	ca	2.2E+00	ca	8.7E-03	ca	8.4E-02	ca		
		3.0E-03	n			3.0E-03	r	0 0.10	127-63-9	**Diphenyl sulfone**	1.8E+02	nc	1.8E+03	nc	1.1E+01	nc	1.1E+02	nc		
		2.2E-03	i			2.2E-03	r	0 0.10	85-00-7	Diquat	1.3E+02	nc	1.4E+03	nc	8.0E+00	nc	8.0E+01	nc		
8.6E+00	h			8.6E+00	r			0 0.10	1937-37-7	Direct black 38	5.7E-02	ca	2.0E-01	ca	7.8E-04	ca	7.8E-03	ca		
8.1E+00	h			8.1E+00	r			0 0.10	2602-46-2	Direct blue 6	6.0E-02	ca	2.1E-01	ca	8.3E-04	ca	8.3E-03	ca		
9.3E+00	h			9.3E+00	r			0 0.10	16071-86-6	Direct brown 95	5.2E-02	ca	1.9E-01	ca	7.2E-04	ca	7.2E-03	ca		
		4.0E-05	i			4.0E-05	r	0 0.10	298-04-4	Disulfoton	2.4E+00	nc	2.5E+01	nc	1.5E-01	nc	1.5E+00	nc		
		1.0E-02	i			1.0E-02	r	0 0.10	505-29-3	1,4-Dithiane	6.1E+02	nc	6.2E+03	nc	3.7E+01	nc	3.6E+02	nc		
		2.0E-03	i			2.0E-03	r	0 0.10	330-54-1	Diuron	1.2E+02	nc	1.2E+03	nc	7.3E+00	nc	7.3E+01	nc		
		4.0E-03	i			4.0E-03	r	0 0.10	2439-10-3	Dodine	2.4E+02	nc	2.5E+03	nc	1.5E+01	nc	1.5E+02	nc		
		2.0E-01	n						7429-91-6	Dysprosium	1.6E+04	nc	1.0E+05	max			7.3E+03	nc		
		6.0E-03	i			6.0E-03	r	0 0.10	115-29-7	Endosulfan	3.7E+02	nc	3.7E+03	nc	2.2E+01	nc	2.2E+02	nc	1.8E+01	9.0E-01
		2.0E-02	i			2.0E-02	r	0 0.10	145-73-3	Endothall	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
		3.0E-04	i			3.0E-04	r	0 0.10	72-20-8	Endrin	1.8E+01	nc	1.8E+02	nc	1.1E+00	nc	1.1E+01	nc	1.0E+00	5.0E-02
9.9E-03	i	2.0E-03	h	4.2E-03	h	2.9E-04	i	1	106-89-8	Epichlorohydrin	7.6E+00	nc	2.6E+01	nc	1.0E+00	nc	2.0E+00	nc		
		5.7E-03	r			5.7E-03	i	0 0.10	106-88-7	1,2-Epoxybutane	3.5E+02	nc	3.5E+03	nc	2.1E+01	nc	2.1E+02	nc		
		2.5E-02	i			2.5E-02	r	0 0.10	759-94-4	EPTC (S-Ethyl dipropylthiocarbamate)	1.5E+03	nc	1.5E+04	nc	9.1E+01	nc	9.1E+02	nc		

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+++=Non-Standard Method Applied (See Section 2.3 of the "Region 9 PRGs Table User's Guide") sat=Soil Saturation (See Section 4.5) max=Ceiling limit (See Section 2.1) DAF=Dilution Attenuation Factor (See Section 2.5) CAS=Chemical Abstract Services

TOXICITY INFORMATION										CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs) "Direct Contact Exposure Pathways"								SOIL SCREENING LEVELS "Migration to Ground Water"	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFI 1/(mg/kg-d)		RfDI (mg/kg-d)		V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
		5.0E-03	I			5.0E-03	r	0	0.10	16672-87-0	Ethephon (2-chloroethyl phosphonic acid)	3.1E+02	nc	3.1E+03	nc	1.8E+01	nc	1.8E+02	nc		
		5.0E-04	I			5.0E-04	r	0	0.10	563-12-2	Ethion	3.1E+01	nc	3.1E+02	nc	1.8E+00	nc	1.8E+01	nc		
		4.0E-01	h			5.7E-02	i	0	0.10	110-80-5	2-Ethoxyethanol	2.4E+04	nc	1.0E+05	max	2.1E+02	nc	1.5E+04	nc		
		3.0E-01	h			3.0E-01	r	0	0.10	111-15-9	2-Ethoxyethanol acetate	1.8E+04	nc	1.0E+05	max	1.1E+03	nc	1.1E+04	nc		
		9.0E-01	I			9.0E-01	r	1		141-78-6	Ethyl acetate	1.9E+04	nc	3.7E+04	sat	3.3E+03	nc	5.5E+03	nc		
4.8E-02	h			4.8E-02	r			1		140-88-5	Ethyl acrylate	2.1E-01	ca	4.5E-01	ca	1.4E-01	ca	2.3E-01	ca		
3.85E-03	r	1.0E-01	I	3.85E-03	n	2.9E-01	I	1		100-41-4	**Ethylbenzene**	8.9E+00	ca	2.0E+01	ca	1.7E+00	ca	2.9E+00	ca	1.3E+01	7.0E-01
2.9E-03	n	4.0E-01	n	2.9E-03	r	2.9E+00	I	1		75-00-3	Ethyl chloride	3.0E+00	ca	6.5E+00	ca	2.3E+00	ca	4.6E+00	ca		
		3.0E-01	h			3.0E-01	r	0	0.10	109-78-4	Ethylene cyanohydrin	1.8E+04	nc	1.0E+05	max	1.1E+03	nc	1.1E+04	nc		
		2.0E-02	h			2.0E-02	r	0	0.10	107-15-3	Ethylene diamine	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
		2.0E+00	I			2.0E+00	r	0	0.10	107-21-1	Ethylene glycol	1.0E+05	max	1.0E+05	max	7.3E+03	nc	7.3E+04	nc		
		5.0E-01	I			3.7E+00	I	0	0.10	111-76-2	Ethylene glycol, monobutyl ether	3.1E+04	nc	1.0E+05	max	1.4E+04	nc	1.8E+04	nc		
1.0E+00	h			3.5E-01	h			1		75-21-8	Ethylene oxide	1.4E-01	ca	3.4E-01	ca	1.9E-02	ca	2.4E-02	ca		
1.1E-01	h	8.0E-05	I	1.1E-01	r	8.0E-05	r	0	0.10	96-45-7	Ethylene thiourea (ETU)	4.4E+00	ca**	1.6E+01	ca**	6.1E-02	ca**	6.1E-01	ca**		
		2.0E-01	I			2.0E-01	r	1		60-29-7	Ethyl ether	1.8E+03	sat	1.8E+03	sat	7.3E+02	nc	1.2E+03	nc		
		9.0E-02	h			9.0E-02	r	1		97-63-2	Ethyl methacrylate	1.4E+02	sat	1.4E+02	sat	3.3E+02	nc	5.5E+02	nc		
		1.0E-05	I			1.0E-05	r	0	0.10	2104-64-5	Ethyl p-nitrophenyl phenylphosphorothioate	6.1E-01	nc	6.2E+00	nc	3.7E-02	nc	3.6E-01	nc		
		3.0E+00	I			3.0E+00	r	0	0.10	84-72-0	Ethylphthalyl ethyl glycolate	1.0E+05	max	1.0E+05	max	1.1E+04	nc	1.1E+05	nc		
		8.0E-03	I			8.0E-03	r	0	0.10	101200-48-0	Express	4.9E+02	nc	4.9E+03	nc	2.9E+01	nc	2.9E+02	nc		
		2.5E-04	I			2.5E-04	r	0	0.10	22224-92-6	Fenamiphos	1.5E+01	nc	1.5E+02	nc	9.1E-01	nc	9.1E+00	nc		
		1.3E-02	I			1.3E-02	r	0	0.10	2164-17-2	Fluometuron	7.9E+02	nc	8.0E+03	nc	4.7E+01	nc	4.7E+02	nc		
		6.0E-02	I					0	0.10	16984-48-8	Flouride	3.7E+03	nc	3.7E+04	nc			2.2E+03	nc		
		8.0E-02	I			8.0E-02	r	0	0.10	59756-60-4	Fluoridone	4.9E+03	nc	4.9E+04	nc	2.9E+02	nc	2.9E+03	nc		
		2.0E-02	I			2.0E-02	r	0	0.10	56425-91-3	Flurprimidol	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
		6.0E-02	I			6.0E-02	r	0	0.10	66332-96-5	Flutolanil	3.7E+03	nc	3.7E+04	nc	2.2E+02	nc	2.2E+03	nc		
		1.0E-02	I			1.0E-02	r	0	0.10	69409-94-5	Fluvalinate	6.1E+02	nc	6.2E+03	nc	3.7E+01	nc	3.6E+02	nc		
3.5E-03	I	1.0E-01	I	3.5E-03	r	1.0E-01	r	0	0.10	133-07-3	Folpet	1.4E+02	ca*	4.9E+02	ca	1.9E+00	ca	1.9E+01	ca		
1.9E-01	I			1.9E-01	r			0	0.10	72178-02-0	Fomesafen	2.6E+00	ca	9.1E+00	ca	3.5E-02	ca	3.5E-01	ca		
		2.0E-03	I			2.0E-03	r	0	0.10	944-22-9	Fonofos	1.2E+02	nc	1.2E+03	nc	7.3E+00	nc	7.3E+01	nc		
		1.5E-01	I	4.6E-02	I			0	0.10	50-00-0	Formaldehyde	9.2E+03	nc	1.0E+05	nc	1.5E-01	ca	5.5E+03	nc		
		2.0E+00	h			2.0E+00	r	0	0.10	64-18-6	Formic Acid	1.0E+05	max	1.0E+05	max	7.3E+03	nc	7.3E+04	nc		
		3.0E+00	I			3.0E+00	r	0	0.10	39148-24-8	Fosetyl-al	1.0E+05	max	1.0E+05	max	1.1E+04	nc	1.1E+05	nc		
		3.0E+01	I			8.6E+00	h	1		76-13-1	Freon 113	5.6E+03	sat	5.6E+03	sat	3.1E+04	nc	5.9E+04	nc		
		1.0E-03	I			1.0E-03	r	1		110-00-9	Furan	2.5E+00	nc	8.5E+00	nc	3.7E+00	nc	6.1E+00	nc		
3.8E+00	h			3.8E+00	r			0	0.10	67-45-8	Furazolidone	1.3E-01	ca	4.5E-01	ca	1.8E-03	ca	1.8E-02	ca		
		3.0E-03	I			1.4E-02	h	0	0.10	98-01-1	Furfural	1.8E+02	nc	1.8E+03	nc	5.2E+01	nc	1.1E+02	nc		

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TOXICITY INFORMATION									CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs) "Direct Contact Exposure Pathways"								SOIL SCREENING LEVELS "Migration to Ground Water"	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		V O C / skin abs. soils / CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
5.0E+01	h			5.0E+01	r			0 0.10 531-82-8	Furium	9.7E-03	ca	3.4E-02	ca	1.3E-04	ca	1.3E-03	ca		
3.0E-02	i			3.0E-02	r			0 0.10 60568-05-0	Furmecyclox	1.6E+01	ca	5.7E+01	ca	2.2E-01	ca	2.2E+00	ca		
		4.0E-04	i			4.0E-04	r	0 0.10 77182-82-2	Glufosinate-ammonium	2.4E+01	nc	2.5E+02	nc	1.5E+00	nc	1.5E+01	nc		
		4.0E-04	i			2.9E-04	h	0 0.10 765-34-4	Glycidaldehyde	2.4E+01	nc	2.5E+02	nc	1.0E+00	nc	1.5E+01	nc		
		1.0E-01	i			1.0E-01	r	0 0.10 1071-83-6	Glyphosate	6.1E+03	nc	6.2E+04	nc	3.7E+02	nc	3.6E+03	nc		
		5.0E-05	i			5.0E-05	r	0 0.10 69806-40-2	Haloxyfop-methyl	3.1E+00	nc	3.1E+01	nc	1.8E-01	nc	1.8E+00	nc		
		1.3E-02	i			1.3E-02	r	0 0.10 79277-27-3	Harmony	7.9E+02	nc	8.0E+03	nc	4.7E+01	nc	4.7E+02	nc		
4.5E+00	i	5.0E-04	i	4.6E+00	i	5.0E-04	r	0 0.10 76-44-8	Heptachlor	1.1E-01	ca	3.8E-01	ca	1.5E-03	ca	1.5E-02	ca	2.3E+01	1.0E+00
9.1E+00	i	1.3E-05	i	9.1E+00	i	1.3E-05	r	0 0.10 1024-57-3	Heptachlor epoxide	5.3E-02	ca*	1.9E-01	ca*	7.4E-04	ca*	7.4E-03	ca*	7.0E-01	3.0E-02
		2.0E-03	i			2.0E-03	r	0 0.10 87-82-1	Hexabromobenzene	1.2E+02	nc	1.2E+03	nc	7.3E+00	nc	7.3E+01	nc		
1.6E+00	i	8.0E-04	i	1.6E+00	i	8.0E-04	r	0 0.10 118-74-1	Hexachlorobenzene	3.0E-01	ca	1.1E+00	ca	4.2E-03	ca	4.2E-02	ca	2.0E+00	1.0E-01
7.8E-02	i	3.00E-04	n	7.8E-02	i	3.00E-04	r	0 0.10 87-68-3	Hexachlorobutadiene	6.2E+00	ca**	2.2E+01	ca**	8.6E-02	ca*	8.6E-01	ca*	2.0E+00	1.0E-01
6.3E+00	i	5.0E-04	n	6.3E+00	i	5.0E-04	r	0 0.04 319-84-6	**HCH (alpha)**	9.0E-02	ca	3.6E-01	ca	1.1E-03	ca	1.1E-02	ca	5.0E-04	3.0E-05
1.8E+00	i	2.0E-04	n	1.8E+00	i	2.0E-04	r	0 0.04 319-85-7	**HCH (beta)**	3.2E-01	ca	1.3E+00	ca	3.7E-03	ca	3.7E-02	ca	3.0E-03	1.0E-04
1.3E+00	h	3.0E-04	i	1.3E+00	r	3.0E-04	r	0 0.04 58-89-9	HCH (gamma) Lindane	4.4E-01	ca*	1.7E+00	ca	5.2E-03	ca	5.2E-02	ca	9.0E-03	5.0E-04
1.8E+00	i			1.8E+00	i			0 0.04 608-73-1	HCH-technical	3.2E-01	ca	1.3E+00	ca	3.8E-03	ca	3.7E-02	ca	3.0E-03	1.0E-04
		6.0E-03	i			5.7E-05	i	0 0.10 77-47-4	**Hexachlorocyclopentadiene**	3.7E+02	nc	3.7E+03	nc	2.1E-01	nc	2.2E+02	nc	4.0E+02	2.0E+01
1.4E-02	i	1.0E-03	i	1.4E-02	i	1.0E-03	r	0 0.10 67-72-1	Hexachloroethane	3.5E+01	ca**	1.2E+02	ca**	4.8E-01	ca**	4.8E+00	ca**	5.0E-01	2.0E-02
		3.0E-04	i			3.0E-04	r	0 0.10 70-30-4	Hexachlorophene	1.8E+01	nc	1.8E+02	nc	1.1E+00	nc	1.1E+01	nc		
1.1E-01	i	3.0E-03	i	1.1E-01	r	3.0E-03	r	0 0.10 121-82-4	Hexahydro-1,3,5-trinitro-1,3,5-triazine	4.4E+00	ca*	1.6E+01	ca	6.1E-02	ca	6.1E-01	ca		
		2.9E-06	r			2.9E-06	i	0 0.10 822-06-0	1,6-Hexamethylene diisocyanate	1.7E-01	nc	1.8E+00	nc	1.0E-02	nc	1.0E-01	nc		
		6.0E-02	h			5.7E-02	i	1 110-54-3	n-Hexane	1.1E+02	sat	1.1E+02	sat	2.1E+02	nc	3.5E+02	nc		
		3.3E-02	i			3.3E-02	r	0 0.10 51235-04-2	Hexazinone	2.0E+03	nc	2.0E+04	nc	1.2E+02	nc	1.2E+03	nc		
3.0E+00	i			1.7E+01	i			0 0.10 302-01-2	Hydrazine, hydrazine sulfate	1.6E-01	ca	5.7E-01	ca	3.9E-04	ca	2.2E-02	ca		
3.0E+00	n			1.7E+01	n			0.10 60-34-4	Hydrazine, monomethyl	1.6E-01	ca	5.7E-01	ca	4.0E-04	ca	2.2E-02	ca		
3.0E+00	n			1.7E+01	n			0.10 57-14-7	Hydrazine, dimethyl	1.6E-01	ca	5.7E-01	ca	4.0E-04	ca	2.2E-02	ca		
						5.7E-03	i	7647-01-0	Hydrogen chloride					2.1E+01	nc				
		2.0E-02	i			8.6E-04	i	1 74-90-8	Hydrogen cyanide	1.1E+01	nc	3.5E+01	nc	3.1E+00	nc	6.2E+00	nc		
		3.0E-03	i			2.9E-04	i	7783-06-4	Hydrogen sulfide					1.0E+00	nc	1.1E+02	nc		
		4.0E-02	h			4.0E-02	r	0 0.10 123-31-9	p-Hydroquinone	2.4E+03	nc	2.5E+04	nc	1.5E+02	nc	1.5E+03	nc		
		1.3E-02	i			1.3E-02	r	0 0.10 35554-44-0	Imazalil	7.9E+02	nc	8.0E+03	nc	4.7E+01	nc	4.7E+02	nc		
		2.5E-01	i			2.5E-01	r	0 0.10 81335-37-7	Imazaquin	1.5E+04	nc	1.0E+05	max	9.1E+02	nc	9.1E+03	nc		
		4.0E-02	i			4.0E-02	r	0 0.10 36734-19-7	Iprodione	2.4E+03	nc	2.5E+04	nc	1.5E+02	nc	1.5E+03	nc		
		3.0E-01	n					0 7439-89-6	Iron	2.3E+04	nc	1.0E+05	max			1.1E+04	nc		
		3.0E-01	i			3.0E-01	r	1 78-83-1	Isobutanol	1.3E+04	nc	4.0E+04	sat	1.1E+03	nc	1.8E+03	nc		
9.5E-04	i	2.0E-01	i	9.5E-04	r	2.0E-01	r	0 0.10 78-59-1	Isophorone	5.1E+02	ca*	1.8E+03	ca*	7.1E+00	ca	7.1E+01	ca	5.0E-01	3.0E-02

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SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
		1.5E-02	I			1.5E-02	r	0	0.10	33820-53-0	Isopropalin	9.2E+02	nc	9.2E+03	nc	5.5E+01	nc	5.5E+02	nc		
		1.0E-01	I			1.1E-01	r	0	0.10	1832-54-8	Isopropyl methyl phosphonic acid	6.1E+03	nc	6.2E+04	nc	4.0E+02	nc	3.6E+03	nc		
		5.0E-02	I			5.0E-02	r	0	0.10	82558-50-7	Isoxaben	3.1E+03	nc	3.1E+04	nc	1.8E+02	nc	1.8E+03	nc		
8.0E+00	n	3.0E-04	n	8.0E+00	r	3.0E-04	r	0	0.10	143-50-0	**Kepone**	6.1E-02	ca	2.2E-01	ca	8.4E-04	ca	8.4E-03	ca		
		2.0E-03	I			2.0E-03	r	0	0.10	77501-63-4	Lactofen	1.2E+02	nc	1.2E+03	nc	7.3E+00	nc	7.3E+01	nc		
For info see: www.epa.gov/oerrpage/superfund/programs/lead/prods.htm#guidance										7439-92-1	Lead+++	4.0E+02	nc	7.5E+02	nc						
For info see: www.dtsc.ca.gov/ScienceTechnology/ledspred.html											**Lead "CAL-Modified PRG"+++**	1.5E+02									
		1.0E-07	I					0	0.10	78-00-2	Lead (tetraethyl)	6.1E-03	nc	6.2E-02	nc			3.6E-03	nc		
		2.0E-03	I			2.0E-03	r	0	0.10	330-55-2	Linuron	1.2E+02	nc	1.2E+03	nc	7.3E+00	nc	7.3E+01	nc		
		2.0E-02	x					0		7439-93-2	Lithium	1.6E+03	nc	2.0E+04	nc			7.3E+02	nc		
		2.0E-01	I			2.0E-01	r	0	0.10	83055-99-6	Londax	1.2E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc		
		2.0E-02	I			2.0E-02	r	0	0.10	121-75-5	Malathion	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
		1.0E-01	I			1.0E-01	r	0	0.10	108-31-6	Maleic anhydride	6.1E+03	nc	6.2E+04	nc	3.7E+02	nc	3.6E+03	nc		
		5.0E-01	I			5.0E-01	r	1		123-33-1	Maleic hydrazide	1.7E+03	nc	2.4E+03	sat	1.8E+03	nc	3.0E+03	nc		
		2.0E-05	h			2.0E-05	r	0	0.10	109-77-3	Malononitrile	1.2E+00	nc	1.2E+01	nc	7.3E-02	nc	7.3E-01	nc		
		3.0E-02	h			3.0E-02	r	0	0.10	8018-01-7	Mancozeb	1.8E+03	nc	1.8E+04	nc	1.1E+02	nc	1.1E+03	nc		
6.0E-02	o	5.0E-03	I	6.0E-02	r	5.0E-03	r	0	0.10	12427-38-2	Maneb	8.1E+00	ca*	2.9E+01	ca	1.1E-01	ca	1.1E+00	ca		
		2.4E-02	I			1.4E-05	I	0		7439-96-5	Manganese and compounds+++	1.8E+03	nc	1.9E+04	nc	5.1E-02	nc	8.8E+02	nc		
		9.0E-05	h			9.0E-05	r	0	0.10	950-10-7	Mephosfolan	5.5E+00	nc	5.5E+01	nc	3.3E-01	nc	3.3E+00	nc		
		3.0E-02	I			3.0E-02	r	0	0.10	24307-26-4	Mepiquat chloride	1.8E+03	nc	1.8E+04	nc	1.1E+02	nc	1.1E+03	nc		
2.9E-02	n	1.0E-01	n	2.9E-02	r	1.0E-01	r	0	0.10	149-30-4	2-Mercaptobenzothiazole	1.7E+01	ca	5.9E+01	ca	2.3E-01	ca	2.3E+00	ca		
		3.0E-04	I					0		7487-94-7	Mercury and compounds	2.3E+01	nc	3.1E+02	nc			1.1E+01	nc		
						8.6E-05	I			7439-97-6	Mercury (elemental)					3.1E-01	nc				
		1.0E-04	I					0	0.10	22967-92-6	Mercury (methyl)	6.1E+00	nc	6.2E+01	nc			3.6E+00	nc		
		3.0E-05	I			3.0E-05	r	0	0.10	150-50-5	Merphos	1.8E+00	nc	1.8E+01	nc	1.1E-01	nc	1.1E+00	nc		
		3.0E-05	I			3.0E-05	r	0	0.10	78-48-8	Merphos oxide	1.8E+00	nc	1.8E+01	nc	1.1E-01	nc	1.1E+00	nc		
		6.0E-02	I			6.0E-02	r	0	0.10	57837-19-1	Metalaxyl	3.7E+03	nc	3.7E+04	nc	2.2E+02	nc	2.2E+03	nc		
		1.0E-04	I			2.0E-04	h	1		126-98-7	Methacrylonitrile	2.1E+00	nc	8.4E+00	nc	7.3E-01	nc	1.0E+00	nc		
		5.0E-05	I			5.0E-05	r	0	0.10	10265-92-6	Methamidophos	3.1E+00	nc	3.1E+01	nc	1.8E-01	nc	1.8E+00	nc		
		5.0E-01	I			5.0E-01	r	0	0.10	67-56-1	Methanol	3.1E+04	nc	1.0E+05	max	1.8E+03	nc	1.8E+04	nc		
		1.0E-03	I			1.0E-03	r	0	0.10	950-37-8	Methidathion	6.1E+01	nc	6.2E+02	nc	3.7E+00	nc	3.6E+01	nc		
		2.5E-02	I			2.5E-02	r	1		16752-77-5	Methomyl	4.4E+01	nc	1.5E+02	nc	9.1E+01	nc	1.5E+02	nc		
		5.0E-03	I			5.0E-03	r	0	0.10	72-43-5	Methoxychlor	3.1E+02	nc	3.1E+03	nc	1.8E+01	nc	1.8E+02	nc	1.6E+02	8.0E+00
		1.0E-03	h			5.7E-03	I	0	0.10	109-86-4	2-Methoxyethanol	6.1E+01	nc	6.2E+02	nc	2.1E+01	nc	3.6E+01	nc		
		2.0E-03	h			2.0E-03	r	0	0.10	110-49-6	2-Methoxyethanol acetate	1.2E+02	nc	1.2E+03	nc	7.3E+00	nc	7.3E+01	nc		
4.6E-02	h			4.6E-02	r			0	0.10	99-59-2	2-Methoxy-5-nitroaniline	1.1E+01	ca	3.7E+01	ca	1.5E-01	ca	1.5E+00	ca		

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		1.0E+00	h			1.0E+00	r	1		79-20-9	Methyl acetate	2.2E+04	nc	9.2E+04	nc	3.7E+03	nc	6.1E+03	nc		
		3.0E-02	h			3.0E-02	r	1		96-33-3	Methyl acrylate	7.0E+01	nc	2.3E+02	nc	1.1E+02	nc	1.8E+02	nc		
2.4E-01	h			2.4E-01	r			0	0.10	95-53-4	2-Methylaniline (o-toluidine)	2.0E+00	ca	7.2E+00	ca	2.8E-02	ca	2.8E-01	ca		
1.8E-01	h			1.8E-01	r			0	0.10	636-21-5	2-Methylaniline hydrochloride	2.7E+00	ca	9.6E+00	ca	3.7E-02	ca	3.7E-01	ca		
		5.0E-04	i			5.0E-04	r	0	0.10	94-74-6	2-Methyl-4-chlorophenoxyacetic acid	3.1E+01	nc	3.1E+02	nc	1.8E+00	nc	1.8E+01	nc		
		1.0E-02	i			1.0E-02	r	0	0.10	94-81-5	4-(2-Methyl-4-chlorophenoxy) butyric acid	6.1E+02	nc	6.2E+03	nc	3.7E+01	nc	3.6E+02	nc		
		1.0E-03	i			1.0E-03	r	0	0.10	93-65-2	2-(2-Methyl-4-chlorophenoxy) propionic acid	6.1E+01	nc	6.2E+02	nc	3.7E+00	nc	3.6E+01	nc		
		1.0E-03	i			1.0E-03	r	0	0.10	16484-77-8	2-(2-Methyl-1,4-chlorophenoxy) propionic acid	6.1E+01	nc	6.2E+02	nc	3.7E+00	nc	3.6E+01	nc		
		8.6E-01	r			8.6E-01	h	1		108-87-2	Methylcyclohexane	2.6E+03	nc	8.7E+03	nc	3.1E+03	nc	5.2E+03	nc		
2.5E-01	h			2.5E-01	r			0	0.10	101-77-9	4,4'-Methylenebisbenzeneamine	1.9E+00	ca	6.9E+00	ca	2.7E-02	ca	2.7E-01	ca		
1.3E-01	h	7.0E-04	h	1.3E-01	h	7.0E-04	r	0	0.10	101-14-4	4,4'-Methylene bis(2-chloroaniline)	3.7E+00	ca*	1.3E+01	ca*	5.2E-02	ca*	5.2E-01	ca*		
4.6E-02	i			4.6E-02	r			0	0.10	101-61-1	4,4'-Methylene bis(N,N'-dimethyl)aniline	1.1E+01	ca	3.7E+01	ca	1.5E-01	ca	1.5E+00	ca		
		1.0E-02	h			1.0E-02	r	1		74-95-3	Methylene bromide	6.7E+01	nc	2.3E+02	nc	3.7E+01	nc	6.1E+01	nc		
7.5E-03	i	6.0E-02	i	1.6E-03	i	8.6E-01	h	1		75-09-2	Methylene chloride	9.1E+00	ca	2.1E+01	ca	4.1E+00	ca	4.3E+00	ca	2.0E-02	1.0E-03
		1.7E-04	r			1.7E-04	i	0	0.10	101-68-8	4,4'-Methylene diphenyl diisocyanate	1.0E+01	nc	1.0E+02	nc	6.2E-01	nc	6.2E+00	nc		
		6.0E-01	i			2.9E-01	i	1		78-93-3	Methyl ethyl ketone	7.3E+03	nc	2.7E+04	nc	1.0E+03	nc	1.9E+03	nc		
		8.0E-02	h			2.3E-02	h	1		108-10-1	Methyl isobutyl ketone	7.9E+02	nc	2.8E+03	nc	8.3E+01	nc	1.6E+02	nc		
		5.7E-04	r			5.7E-04	n	0	0.10	74-93-1	Methyl Mercaptan	3.5E+01	nc	3.5E+02	nc	2.1E+00	nc	2.1E+01	nc		
		1.4E+00	i			2.0E-01	i	1		80-62-6	Methyl methacrylate	2.2E+03	nc	2.7E+03	sat	7.3E+02	nc	1.4E+03	nc		
3.3E-02	h			3.3E-02	r			0	0.10	99-55-8	2-Methyl-5-nitroaniline	1.5E+01	ca	5.2E+01	ca	2.0E-01	ca	2.0E+00	ca		
		2.5E-04	I			2.5E-04	r	0	0.10	298-00-0	Methyl parathion	1.5E+01	nc	1.5E+02	nc	9.1E-01	nc	9.1E+00	nc		
		5.0E-02	i			5.0E-02	r	0	0.10	95-48-7	2-Methylphenol	3.1E+03	nc	3.1E+04	nc	1.8E+02	nc	1.8E+03	nc	1.5E+01	8.0E-01
		5.0E-02	i			5.0E-02	r	0	0.10	108-39-4	3-Methylphenol	3.1E+03	nc	3.1E+04	nc	1.8E+02	nc	1.8E+03	nc		
		5.0E-03	h			5.0E-03	r	0	0.10	106-44-5	4-Methylphenol	3.1E+02	nc	3.1E+03	nc	1.8E+01	nc	1.8E+02	nc		
		2.0E-02	n			2.0E-02	r	0	0.10	993-13-5	Methyl phosphonic acid	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
		6.0E-03	h			1.1E-02	h	1		25013-15-4	Methyl styrene (mixture)	1.3E+02	nc	5.4E+02	nc	4.2E+01	nc	6.0E+01	nc		
		7.0E-02	h			7.0E-02	r	1		98-83-9	Methyl styrene (alpha)	6.8E+02	sat	6.8E+02	sat	2.6E+02	nc	4.3E+02	nc		
3.3E-03	n	8.6E-01	r	3.5E-04	n	8.6E-01	i	1		1634-04-4	**Methyl tertbutyl ether (MTBE)**	6.2E+01	ca*	1.6E+02	ca	1.9E+01	ca	1.3E+01	ca		
1.8E-03				1.8E-03				1			"CAL-Modified PRG"	1.7E+01	ca	3.6E+01	ca	3.7E+00	ca	6.2E+00	ca		
		1.5E-01	i			1.5E-01	r	0	0.10	51218-45-2	Metolaclor (Dual)	9.2E+03	nc	9.2E+04	nc	5.5E+02	nc	5.5E+03	nc		
		2.5E-02	I			2.5E-02	r	0	0.10	21087-64-9	Metribuzin	1.5E+03	nc	1.5E+04	nc	9.1E+01	nc	9.1E+02	nc		
1.8E+00	x	2.0E-04	i	1.8E+00	r	2.0E-04	r	0	0.10	2385-85-5	Mirex	2.7E-01	ca*	9.6E-01	ca	3.7E-03	ca	3.7E-02	ca		
		2.0E-03	I			2.0E-03	r	0	0.10	2212-67-1	Molinate	1.2E+02	nc	1.2E+03	nc	7.3E+00	nc	7.3E+01	nc		
		5.0E-03	i					0		7439-98-7	Molybdenum	3.9E+02	nc	5.1E+03	nc			1.8E+02	nc		
		1.0E-01	i			1.0E-01	r	0	0.10	10599-90-3	Monochloramine	6.1E+03	nc	6.2E+04	nc	3.7E+02	nc	3.6E+03	nc		
		2.0E-03	i			2.0E-03	r	0	0.10	300-76-5	Naled	1.2E+02	nc	1.2E+03	nc	7.3E+00	nc	7.3E+01	nc		

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+++=Non-Standard Method Applied (See Section 2.3 of the "Region 9 PRGs Table User's Guide") sat=Soil Saturation (See Section 4.5) max=Ceiling limit (See Section 2.1) DAF=Dilution Attenuation Factor (See Section 2.5) CAS=Chemical Abstract Services

TOXICITY INFORMATION									CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs) "Direct Contact Exposure Pathways"								SOIL SCREENING LEVELS "Migration to Ground Water"	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		V O C / skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
		1.0E-01	i			1.0E-01	r	0 / 0.10	15299-99-7	Napropamide	6.1E+03	nc	6.2E+04	nc	3.7E+02	nc	3.6E+03	nc		
		2.0E-02	i					0 /	7440-02-0	Nickel (soluble salts)	1.6E+03	nc	2.0E+04	nc			7.3E+02	nc	1.3E+02	7.0E+00
				8.4E-01	i			0 /		Nickel refinery dust					8.0E-03	ca				
				1.7E+00	i			0 /	12035-72-2	Nickel subsulfide			1.1E+04	ca	4.0E-03	ca				
Tap Water PRG Based on Infant NOAEL (see IRIS)								/	14797-55-8	Nitrate+++							1.0E+04	nc		
Tap Water PRG Based on Infant NOAEL (see IRIS)								/	14797-65-0	Nitrite+++							1.0E+03	nc		
		2.86E-05	r			2.86E-05	h	0 / 0.10	88-74-4	**2-Nitroaniline**	1.7E+00	nc	1.8E+01	nc	1.0E-01	nc	1.0E+00	nc		
		5.0E-04	i			5.7E-04	h	1 /	98-95-3	Nitrobenzene	2.0E+01	nc	1.0E+02	nc	2.1E+00	nc	3.4E+00	nc	1.0E-01	7.0E-03
		7.0E-02	h			7.0E-02	r	0 / 0.10	67-20-9	Nitrofurantoin	4.3E+03	nc	4.3E+04	nc	2.6E+02	nc	2.6E+03	nc		
1.5E+00	h			1.5E+00	r			0 / 0.10	59-87-0	Nitrofurazone	3.2E-01	ca	1.1E+00	ca	4.5E-03	ca	4.5E-02	ca		
1.4E-02	n			1.4E-02	r			0 / 0.10	55-63-0	Nitroglycerin	3.5E+01	ca	1.2E+02	ca	4.8E-01	ca	4.8E+00	ca		
		1.0E-01	i			1.0E-01	r	0 / 0.10	556-88-7	Nitroguanidine	6.1E+03	nc	6.2E+04	nc	3.7E+02	nc	3.6E+03	nc		
9.4E+00	r	5.7E-03	r	9.4E+00	h	5.7E-03	i	1 /	79-46-9	2-Nitropropane					7.2E-04	ca	1.2E-03	ca		
5.4E+00	i			5.6E+00	i			1 /	924-16-3	N-Nitrosodi-n-butylamine	2.4E-02	ca	5.8E-02	ca	1.2E-03	ca	2.0E-03	ca		
2.8E+00	i			2.8E+00	r			0 / 0.10	1116-54-7	N-Nitrosodiethanolamine	1.7E-01	ca	6.2E-01	ca	2.4E-03	ca	2.4E-02	ca		
1.5E+02	i			1.5E+02	i			0 / 0.10	55-18-5	N-Nitrosodiethylamine	3.2E-03	ca	1.1E-02	ca	4.5E-05	ca	4.5E-04	ca		
5.1E+01	i			4.9E+01	i			0 / 0.10	62-75-9	N-Nitrosodimethylamine	9.5E-03	ca	3.4E-02	ca	1.4E-04	ca	1.3E-03	ca		
4.9E-03	i			4.9E-03	r			0 / 0.10	86-30-6	N-Nitrosodiphenylamine	9.9E+01	ca	3.5E+02	ca	1.4E+00	ca	1.4E+01	ca	1.0E+00	6.0E-02
7.0E+00	i			7.0E+00	r			0 / 0.10	621-64-7	N-Nitroso di-n-propylamine	6.9E-02	ca	2.5E-01	ca	9.6E-04	ca	9.6E-03	ca	5.0E-05	2.0E-06
2.2E+01	i			2.2E+01	r			0 / 0.10	10595-95-6	N-Nitroso-N-methylethylamine	2.2E-02	ca	7.8E-02	ca	3.1E-04	ca	3.1E-03	ca		
2.1E+00	i			2.1E+00	i			0 / 0.10	930-55-2	N-Nitrosopyrrolidine	2.3E-01	ca	8.2E-01	ca	3.1E-03	ca	3.2E-02	ca		
		1.0E-02	h			1.0E-02	r	1 /	99-08-1	m-Nitrotoluene	3.7E+02	nc	1.0E+03	sat	3.7E+01	nc	6.1E+01	nc		
		1.0E-02	h			1.0E-02	r	1 /	99-08-1	o-Nitrotoluene	3.7E+02	nc	1.0E+03	sat	3.7E+01	nc	6.1E+01	nc		
		1.0E-02	h			1.0E-02	r	1 /	99-99-0	p-Nitrotoluene	3.7E+02	nc	1.0E+03	sat	3.7E+01	nc	6.1E+01	nc		
		4.0E-02	I			4.0E-02	r	0 / 0.10	27314-13-2	Norflurazon	2.4E+03	nc	2.5E+04	nc	1.5E+02	nc	1.5E+03	nc		
		7.0E-04	i			7.0E-04	r	0 / 0.10	85509-19-9	NuStar	4.3E+01	nc	4.3E+02	nc	2.6E+00	nc	2.6E+01	nc		
		3.0E-03	i			3.0E-03	r	0 / 0.10	32536-52-0	Octabromodiphenyl ether	1.8E+02	nc	1.8E+03	nc	1.1E+01	nc	1.1E+02	nc		
		5.0E-02	i			5.0E-02	r	0 / 0.10	2691-41-0	Octahydro-1357-tetranitro-1357- tetrazocine (HMX)	3.1E+03	nc	3.1E+04	nc	1.8E+02	nc	1.8E+03	nc		
		2.0E-03	h			2.0E-03	r	0 / 0.10	152-16-9	Octamethylpyrophosphoramide	1.2E+02	nc	1.2E+03	nc	7.3E+00	nc	7.3E+01	nc		
		5.0E-02	i			5.0E-02	r	0 / 0.10	19044-88-3	Oryzalin	3.1E+03	nc	3.1E+04	nc	1.8E+02	nc	1.8E+03	nc		
		5.0E-03	i			5.0E-03	r	0 / 0.10	19666-30-9	Oxadiazon	3.1E+02	nc	3.1E+03	nc	1.8E+01	nc	1.8E+02	nc		
		2.5E-02	i			2.5E-02	r	0 / 0.10	23135-22-0	Oxamyl	1.5E+03	nc	1.5E+04	nc	9.1E+01	nc	9.1E+02	nc		
		3.0E-03	i			3.0E-03	r	0 / 0.10	42874-03-3	Oxyfluorfen	1.8E+02	nc	1.8E+03	nc	1.1E+01	nc	1.1E+02	nc		
		1.3E-02	i			1.3E-02	r	0 / 0.10	76738-62-0	Paclobutrazol	7.9E+02	nc	8.0E+03	nc	4.7E+01	nc	4.7E+02	nc		
		4.5E-03	I			4.5E-03	r	0 / 0.10	4685-14-7	Paraquat	2.7E+02	nc	2.8E+03	nc	1.6E+01	nc	1.6E+02	nc		
		6.0E-03	h			6.0E-03	r	0 / 0.10	56-38-2	Parathion	3.7E+02	nc	3.7E+03	nc	2.2E+01	nc	2.2E+02	nc		

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TOXICITY INFORMATION										CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs) "Direct Contact Exposure Pathways"								SOIL SCREENING LEVELS "Migration to Ground Water"	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
		5.0E-02	h			5.0E-02	r	0	0.10	1114-71-2	Pebulate	3.1E+03	nc	3.1E+04	nc	1.8E+02	nc	1.8E+03	nc		
		4.0E-02	i			4.0E-02	r	0	0.10	40487-42-1	Pendimethalin	2.4E+03	nc	2.5E+04	nc	1.5E+02	nc	1.5E+03	nc		
2.3E-02	h			2.3E-02	r			0	0.10	87-84-3	Pentabromo-6-chloro cyclohexane	2.1E+01	ca	7.5E+01	ca	2.9E-01	ca	2.9E+00	ca		
		2.0E-03	i			2.0E-03	r	0	0.10	32534-81-9	Pentabromodiphenyl ether	1.2E+02	nc	1.2E+03	nc	7.3E+00	nc	7.3E+01	nc		
		8.0E-04	i			8.0E-04	r	0	0.10	608-93-5	Pentachlorobenzene	4.9E+01	nc	4.9E+02	nc	2.9E+00	nc	2.9E+01	nc		
2.6E-01	h	3.0E-03	i	2.6E-01	r	3.0E-03	r	0	0.10	82-68-8	Pentachloronitrobenzene	1.9E+00	ca*	6.6E+00	ca	2.6E-02	ca	2.6E-01	ca		
1.2E-01	i	3.0E-02	i	1.2E-01	r	3.0E-02	r	0	0.25	87-86-5	Pentachlorophenol	3.0E+00	ca	9.0E+00	ca	5.6E-02	ca	5.6E-01	ca	3.0E-02	1.0E-03
		1.00E-04	x					0		7601-90-3	Perchlorate	7.8E+00	ca/nc	1.0E+02	ca/nc			3.6E+00	ca/nc		
		5.0E-02	i			5.0E-02	r	0	0.10	52645-53-1	Permethrin	3.1E+03	nc	3.1E+04	nc	1.8E+02	nc	1.8E+03	nc		
		2.5E-01	i			2.5E-01	r	0	0.10	13684-63-4	Phenmedipham	1.5E+04	nc	1.0E+05	max	9.1E+02	nc	9.1E+03	nc		
		6.0E-01	i			6.0E-01	r	0	0.10	108-95-2	Phenol	3.7E+04	nc	1.0E+05	max	2.2E+03	nc	2.2E+04	nc	1.0E+02	5.0E+00
		2.0E-03	n			2.0E-03	r	0	0.10	92-84-2	Phenothiazine	1.2E+02	nc	1.2E+03	nc	7.3E+00	nc	7.3E+01	nc		
		6.0E-03	i			6.0E-03	r	0	0.10	108-45-2	m-Phenylenediamine	3.7E+02	nc	3.7E+03	nc	2.2E+01	nc	2.2E+02	nc		
		1.9E-01	h			1.9E-01	r	0	0.10	106-50-3	p-Phenylenediamine	1.2E+04	nc	1.0E+05	max	6.9E+02	nc	6.9E+03	nc		
		8.0E-05	i			8.0E-05	r	0	0.10	62-38-4	Phenylmercuric acetate	4.9E+00	nc	4.9E+01	nc	2.9E-01	nc	2.9E+00	nc		
1.9E-03	h			1.9E-03	r			0	0.10	90-43-7	2-Phenylphenol	2.5E+02	ca	8.9E+02	ca	3.5E+00	ca	3.5E+01	ca		
		2.0E-04	h			2.0E-04	r	0	0.10	298-02-2	Phorate	1.2E+01	nc	1.2E+02	nc	7.3E-01	nc	7.3E+00	nc		
		2.0E-02	i			2.0E-02	r	0	0.10	732-11-6	Phosmet	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
		3.0E-04	i			8.6E-05	i	0	0.10	7803-51-2	Phosphine	1.8E+01	nc	1.8E+02	nc	3.1E-01	nc	1.1E+01	nc		
						2.9E-03	i			7664-38-2	Phosphoric acid					1.0E+01	nc				
		2.0E-05	i					0		7723-14-0	Phosphorus (white)	1.6E+00	nc	2.0E+01	nc			7.3E-01	nc		
		1.0E+00	h			1.0E+00	r	0	0.10	100-21-0	p-Phthalic acid	6.1E+04	nc	1.0E+05	max	3.7E+03	nc	3.6E+04	nc		
		2.0E+00	i			3.4E-02	h	0	0.10	85-44-9	Phthalic anhydride	1.0E+05	max	1.0E+05	max	1.2E+02	nc	7.3E+04	nc		
		7.0E-02	i			7.0E-02	r	0	0.10	1918-02-1	Picloram	4.3E+03	nc	4.3E+04	nc	2.6E+02	nc	2.6E+03	nc		
		1.0E-02	i			1.0E-02	r	0	0.10	29232-93-7	Pirimiphos-methyl	6.1E+02	nc	6.2E+03	nc	3.7E+01	nc	3.6E+02	nc		
8.9E+00	h	7.0E-06	h	8.9E+00	r	7.0E-06	r	0	0.10		Polybrominated biphenyls	5.5E-02	ca**	1.9E-01	ca*	7.6E-04	ca*	7.6E-03	ca*		
2.0E+00	i			2.0E+00	i			0	0.14	1336-36-3	Polychlorinated biphenyls (PCBs)	2.2E-01	ca	7.4E-01	ca	3.4E-03	ca	3.4E-02	ca		
7.0E-02	i	7.0E-05	i	7.0E-02	i	7.0E-05	r	0	0.14	12674-11-2	Aroclor 1016	3.9E+00	nc	2.1E+01	ca**	9.6E-02	ca**	9.6E-01	ca**		
2.0E+00	i			2.0E+00	i			0	0.14	11104-28-2	Aroclor 1221	2.2E-01	ca	7.4E-01	ca	3.4E-03	ca	3.4E-02	ca		
2.0E+00	i			2.0E+00	i			0	0.14	11141-16-5	Aroclor 1232	2.2E-01	ca	7.4E-01	ca	3.4E-03	ca	3.4E-02	ca		
2.0E+00	i			2.0E+00	i			0	0.14	53469-21-9	Aroclor 1242	2.2E-01	ca	7.4E-01	ca	3.4E-03	ca	3.4E-02	ca		
2.0E+00	i			2.0E+00	i			0	0.14	12672-29-6	Aroclor 1248	2.2E-01	ca	7.4E-01	ca	3.4E-03	ca	3.4E-02	ca		
2.0E+00	i	2.0E-05	i	2.0E+00	i	2.0E-05	r	0	0.14	11097-69-1	Aroclor 1254	2.2E-01	ca**	7.4E-01	ca*	3.4E-03	ca*	3.4E-02	ca*		
2.0E+00	i			2.0E+00	i			0	0.14	11096-82-5	Aroclor 1260	2.2E-01	ca	7.4E-01	ca	3.4E-03	ca	3.4E-02	ca		

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+++=Non-Standard Method Applied (See Section 2.3 of the "Region 9 PRGs Table User's Guide") sat=Soil Saturation (See Section 4.5) max=Ceiling limit (See Section 2.1) DAF=Dilution Attenuation Factor (See Section 2.5) CAS=Chemical Abstract Services

TOXICITY INFORMATION									CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs) "Direct Contact Exposure Pathways"								SOIL SCREENING LEVELS "Migration to Ground Water"	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
4.5E+00	n			4.5E+00	r				0.10	61788-33-8	**Polychlorinated terphenyls**	1.1E-01	ca	3.8E-01	ca	1.5E-03	ca	1.5E-02	ca		
									0.13		Polynuclear aromatic hydrocarbons (PAHs)										
		6.0E-02	i			6.0E-02	r	1		83-32-9	Acenaphthene	3.7E+03	nc	2.9E+04	nc	2.2E+02	nc	3.7E+02	nc	5.7E+02	2.9E+01
		3.0E-01	i			3.0E-01	r	1		120-12-7	Anthracene	2.2E+04	nc	1.0E+05	max	1.1E+03	nc	1.8E+03	nc	1.2E+04	5.9E+02
7.3E-01	n			7.3E-01	r			0	0.13	56-55-3	**Benz[a]anthracene**	6.2E-01	ca	2.1E+00	ca	9.2E-03	ca	9.2E-02	ca	2.0E+00	8.0E-02
7.3E-01	n			7.3E-01	r			0	0.13	205-99-2	**Benzo[b]fluoranthene**	6.2E-01	ca	2.1E+00	ca	9.2E-03	ca	9.2E-02	ca	5.0E+00	2.0E-01
7.3E-02	n			7.3E-02	r			0	0.13	207-08-9	**Benzo[k]fluoranthene**	6.2E+00	ca	2.1E+01	ca	9.2E-02	ca	9.2E-01	ca	4.9E+01	2.0E+00
1.2E+00				3.9E-01					0.13	207-08-9	**"CAL-Modified PRG"**	3.8E-01	ca	1.3E+00	ca	1.7E-02	ca	5.6E-02	ca		
7.3E+00	i			7.3E+00	r			0	0.13	50-32-8	**Benzo[a]pyrene**	6.2E-02	ca	2.1E-01	ca	9.2E-04	ca	9.2E-03	ca	8.0E+00	4.0E-01
7.3E-03	n			7.3E-03	r			0	0.13	218-01-9	**Chrysene**	6.2E+01	ca	2.1E+02	ca	9.2E-01	ca	9.2E+00	ca	1.6E+02	8.0E+00
1.2E-01				3.9E-02					0.13		**"CAL-Modified PRG"**	3.8E+00	ca	1.3E+01	ca	1.7E-01	ca	5.6E-01	ca		
7.3E+00	n			7.3E+00	r			0	0.13	53-70-3	**Dibenz[ah]anthracene**	6.2E-02	ca	2.1E-01	ca	9.2E-04	ca	9.2E-03	ca	2.0E+00	8.0E-02
		4.0E-02	i			4.0E-02	r	0	0.13	206-44-0	Fluoranthene	2.3E+03	nc	2.2E+04	nc	1.5E+02	nc	1.5E+03	nc	4.3E+03	2.1E+02
		4.0E-02	i			4.0E-02	r	1		86-73-7	Fluorene	2.7E+03	nc	2.6E+04	nc	1.5E+02	nc	2.4E+02	nc	5.6E+02	2.8E+01
7.3E-01	n			7.3E-01	r			0	0.13	193-39-5	**Indeno[1,2,3-cd]pyrene**	6.2E-01	ca	2.1E+00	ca	9.2E-03	ca	9.2E-02	ca	1.4E+01	7.0E-01
		2.0E-02	i			8.6E-04	i	1		91-20-3	Naphthalene	5.6E+01	nc	1.9E+02	nc	3.1E+00	nc	6.2E+00	nc	8.4E+01	4.0E+00
		3.0E-02	i			3.0E-02	r	1		129-00-0	Pyrene	2.3E+03	nc	2.9E+04	nc	1.1E+02	nc	1.8E+02	nc	4.2E+03	2.1E+02
1.5E-01	i	9.0E-03	i	1.5E-01	r	9.0E-03	r	0	0.10	67747-09-5	Prochloraz	3.2E+00	ca	1.1E+01	ca	4.5E-02	ca	4.5E-01	ca		
		6.0E-03	h			6.0E-03	r	0	0.10	26399-36-0	Profluralin	3.7E+02	nc	3.7E+03	nc	2.2E+01	nc	2.2E+02	nc		
		1.5E-02	i			1.5E-02	r	0	0.10	1610-18-0	Prometon	9.2E+02	nc	9.2E+03	nc	5.5E+01	nc	5.5E+02	nc		
		4.0E-03	i			4.0E-03	r	0	0.10	7287-19-6	Prometryn	2.4E+02	nc	2.5E+03	nc	1.5E+01	nc	1.5E+02	nc		
		7.5E-02	i			7.5E-02	r	0	0.10	23950-58-5	Pronamide	4.6E+03	nc	4.6E+04	nc	2.7E+02	nc	2.7E+03	nc		
		1.3E-02	i			1.3E-02	r	0	0.10	1918-16-7	Propachlor	7.9E+02	nc	8.0E+03	nc	4.7E+01	nc	4.7E+02	nc		
		5.0E-03	i			5.0E-03	r	0	0.10	709-98-8	Propanil	3.1E+02	nc	3.1E+03	nc	1.8E+01	nc	1.8E+02	nc		
		2.0E-02	i			2.0E-02	r	0	0.10	2312-35-8	Propargite	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
		2.0E-03	i			2.0E-03	r	0	0.10	107-19-7	Propargyl alcohol	1.2E+02	nc	1.2E+03	nc	7.3E+00	nc	7.3E+01	nc		
		2.0E-02	i			2.0E-02	r	0	0.10	139-40-2	Propazine	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
		2.0E-02	i			2.0E-02	r	0	0.10	122-42-9	Propham	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
		1.3E-02	i			1.3E-02	r	0	0.10	60207-90-1	Propiconazole	7.9E+02	nc	8.0E+03	nc	4.7E+01	nc	4.7E+02	nc		
		4.00E-02	n			4.00E-02	r	1		103-65-1	**n-Propylbenzene**	2.4E+02	sat	2.4E+02	sat	1.5E+02	nc	2.4E+02	nc		
		5.0E-01	h			8.6E-04	h	0	0.10	57-55-6	**Propylene glycol**	3.0E+04	nc	1.0E+05	max	3.1E+00	nc	1.8E+04	nc		
		7.0E-01	h			7.0E-01	r	0	0.10	52125-53-8	Propylene glycol, monoethyl ether	4.3E+04	nc	1.0E+05	max	2.6E+03	nc	2.6E+04	nc		
		7.0E-01	h			5.7E-01	i	0	0.10	107-98-2	Propylene glycol, monomethyl ether	4.3E+04	nc	1.0E+05	max	2.1E+03	nc	2.6E+04	nc		
2.4E-01	i	8.6E-03	r	1.3E-02	i	8.6E-03	i	1		75-56-9	Propylene oxide	1.9E+00	ca*	6.6E+00	ca*	5.2E-01	ca*	2.2E-01	ca		

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TOXICITY INFORMATION										CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs) "Direct Contact Exposure Pathways"								SOIL SCREENING LEVELS "Migration to Ground Water"	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
		2.5E-01	i			2.5E-01	r	0	0.10	81335-77-5	Pursuit	1.5E+04	nc	1.0E+05	max	9.1E+02	nc	9.1E+03	nc		
		2.5E-02	i			2.5E-02	r	0	0.10	51630-58-1	Pydrin	1.5E+03	nc	1.5E+04	nc	9.1E+01	nc	9.1E+02	nc		
		1.0E-03	i			1.0E-03	r	0	0.10	110-86-1	Pyridine	6.1E+01	nc	6.2E+02	nc	3.7E+00	nc	3.6E+01	nc		
		5.0E-04	i			5.0E-04	r	0	0.10	13593-03-8	Quinalphos	3.1E+01	nc	3.1E+02	nc	1.8E+00	nc	1.8E+01	nc		
3.0E+00	i			3.0E+00	r			0	0.10	91-22-5	**Quinoline**	1.6E-01	ca	5.7E-01	ca	2.2E-03	ca	2.2E-02	ca		
1.1E-01	i	3.0E-03	i	1.1E-01	r	3.0E-03	r	0	0.10	121-82-4	RDX (Cyclonite)	4.4E+00	ca*	1.6E+01	ca	6.1E-02	ca	6.1E-01	ca		
		3.0E-02	i			3.0E-02	r	0	0.10	10453-86-8	Resmethrin	1.8E+03	nc	1.8E+04	nc	1.1E+02	nc	1.1E+03	nc		
		5.0E-02	h			5.0E-02	r	0	0.10	299-84-3	Ronnel	3.1E+03	nc	3.1E+04	nc	1.8E+02	nc	1.8E+03	nc		
		4.0E-03	i			4.0E-03	r	0	0.10	83-79-4	Rotenone	2.4E+02	nc	2.5E+03	nc	1.5E+01	nc	1.5E+02	nc		
		2.5E-02	i			2.5E-02	r	0	0.10	78587-05-0	Savey	1.5E+03	nc	1.5E+04	nc	9.1E+01	nc	9.1E+02	nc		
		5.0E-03	i					0	0.10	7783-00-8	Selenious Acid	3.1E+02	nc	3.1E+03	nc			1.8E+02	nc		
		5.0E-03	i					0		7782-49-2	Selenium	3.9E+02	nc	5.1E+03	nc			1.8E+02	nc	5.0E+00	3.0E-01
		5.0E-03	h					0	0.10	630-10-4	Selenourea	3.1E+02	nc	3.1E+03	nc			1.8E+02	nc		
		9.0E-02	i			9.0E-02	r	0	0.10	74051-80-2	Sethoxydim	5.5E+03	nc	5.5E+04	nc	3.3E+02	nc	3.3E+03	nc		
		5.0E-03	i					0		7440-22-4	Silver and compounds	3.9E+02	nc	5.1E+03	nc			1.8E+02	nc	3.4E+01	2.0E+00
1.2E-01	h	5.0E-03	i	1.2E-01	r	2.0E-03	r	0	0.10	122-34-9	Simazine	4.1E+00	ca*	1.4E+01	ca	5.6E-02	ca	5.6E-01	ca		
		4.0E-03	i							26628-22-8	Sodium azide										
2.7E-01	h	3.0E-02	i	2.7E-01	r	3.0E-02	r	0	0.10	148-18-5	Sodium diethyldithiocarbamate	1.8E+00	ca	6.4E+00	ca	2.5E-02	ca	2.5E-01	ca		
		2.0E-05	i			2.0E-05	r	0	0.10	62-74-8	Sodium fluoroacetate	1.2E+00	nc	1.2E+01	nc	7.3E-02	nc	7.3E-01	nc		
		1.0E-03	h			1.0E-03	r	0	0.10	13718-26-8	Sodium metavanadate	6.1E+01	nc	6.2E+02	nc	3.7E+00	nc	3.6E+01	nc		
		6.0E-01	i					0		7440-24-6	Strontium, stable	4.7E+04	nc	1.0E+05	max			2.2E+04	nc		
		3.0E-04	I			3.0E-04	r	0	0.10	57-24-9	Strychnine	1.8E+01	nc	1.8E+02	nc	1.1E+00	nc	1.1E+01	nc		
		2.0E-01	i			2.9E-01	i	1		100-42-5	Styrene	1.7E+03	sat	1.7E+03	sat	1.1E+03	nc	1.6E+03	nc	4.0E+00	2.0E-01
		1.00E-03	n			1.00E-03	r			80-07-9	1,1'-Sulfonylbis (4-chlorobenzene)	7.8E+01	nc	1.0E+03	nc	3.7E+00	nc	3.6E+01	nc		
		2.5E-02	i			2.5E-02	r	0	0.10	88671-89-0	Systhane	1.5E+03	nc	1.5E+04	nc	9.1E+01	nc	9.1E+02	nc		
1.5E+05	h			1.5E+05	h			0	0.03	1746-01-6	2,3,7,8-TCDD (dioxin)	3.9E-06	ca	1.6E-05	ca	4.5E-08	ca	4.5E-07	ca		
		7.0E-02	i			7.0E-02	r	0	0.10	34014-18-1	Tebuthiuron	4.3E+03	nc	4.3E+04	nc	2.6E+02	nc	2.6E+03	nc		
		2.0E-02	h			2.0E-02	r	0	0.10	3383-96-8	Temephos	1.2E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc		
		1.3E-02	i			1.3E-02	r	0	0.10	5902-51-2	Terbacil	7.9E+02	nc	8.0E+03	nc	4.7E+01	nc	4.7E+02	nc		
		2.5E-05	h			2.5E-05	r	0	0.10	13071-79-9	Terbufos	1.5E+00	nc	1.5E+01	nc	9.1E-02	nc	9.1E-01	nc		
		1.0E-03	i			1.0E-03	r	0	0.10	886-50-0	Terbutryn	6.1E+01	nc	6.2E+02	nc	3.7E+00	nc	3.6E+01	nc		
		3.0E-04	i			3.0E-04	r	0	0.10	95-94-3	1,2,4,5-Tetrachlorobenzene	1.8E+01	nc	1.8E+02	nc	1.1E+00	nc	1.1E+01	nc		
2.6E-02	i	3.0E-02	i	2.6E-02	i	3.0E-02	r	1		630-20-6	1,1,1,2-Tetrachloroethane	3.2E+00	ca	7.3E+00	ca	2.6E-01	ca	4.3E-01	ca		
2.0E-01	i	6.00E-02	n	2.0E-01	i	6.00E-02	r	1		79-34-5	1,1,2,2-Tetrachloroethane	4.1E-01	ca	9.3E-01	ca	3.3E-02	ca	5.5E-02	ca	3.0E-03	2.0E-04
5.2E-02	n	1.0E-02	i	1.00E-02	n	1.7E-01	n	1		127-18-4	**Tetrachloroethylene (PCE)**	1.5E+00	ca*	3.4E+00	ca*	6.7E-01	ca	6.6E-01	ca	6.0E-02	3.0E-03
		3.0E-02	i			3.0E-02	r	0	0.10	58-90-2	2,3,4,6-Tetrachlorophenol	1.8E+03	nc	1.8E+04	nc	1.1E+02	nc	1.1E+03	nc		

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SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
2.0E+01	h			2.0E+01	r			0	0.10	5216-25-1	p,a,a,a-Tetrachlorotoluene	2.4E-02	ca	8.6E-02	ca	3.4E-04	ca	3.4E-03	ca		
2.4E-02	h	3.0E-02	i	2.4E-02	r	3.0E-02	r	0	0.10	961-11-5	Tetrachlorovinphos	2.0E+01	ca*	7.2E+01	ca	2.8E-01	ca	2.8E+00	ca		
		5.0E-04	i			5.0E-04	r	0	0.10	3689-24-5	Tetraethyldithiopyrophosphate	3.1E+01	nc	3.1E+02	nc	1.8E+00	nc	1.8E+01	nc		
7.8E-03	n	2.1E-01	n	6.8E-03	n	8.6E-02	n	1		109-99-9	**Tetrahydrofuran**	9.4E+00	ca	2.1E+01	ca	9.9E-01	ca	1.6E+00	ca		
		6.6E-05	i					0		7440-28-0	Thallium and compounds+++	5.2E+00	nc	6.7E+01	nc			2.4E+00	nc		
		1.0E-02	i			1.0E-02	r	0	0.10	28249-77-6	Thiobencarb	6.1E+02	nc	6.2E+03	nc	3.7E+01	nc	3.6E+02	nc		
		5.0E-02	n			5.0E-02	r	0	0.10	N/A	**Thiocyanate**	3.1E+03	nc	1.0E+05	max	1.8E+02	nc	1.8E+03	nc		
		3.0E-04	h			3.0E-04	r	0	0.10	39196-18-4	Thiofanox	1.8E+01	nc	1.8E+02	nc	1.1E+00	nc	1.1E+01	nc		
		8.0E-02	i			8.0E-02	r	0	0.10	23564-05-8	Thiophanate-methyl	4.9E+03	nc	4.9E+04	nc	2.9E+02	nc	2.9E+03	nc		
		5.0E-03	i			5.0E-03	r	0	0.10	137-26-8	Thiram	3.1E+02	nc	3.1E+03	nc	1.8E+01	nc	1.8E+02	nc		
		6.0E-01	h					0			Tin (inorganic, see tributyltin oxide for organic tin)	4.7E+04	nc	1.0E+05	max			2.2E+04	nc		
		2.0E-01	i			1.1E-01	i	1		108-88-3	Toluene	5.2E+02	sat	5.2E+02	sat	4.0E+02	nc	7.2E+02	nc	1.2E+01	6.0E-01
3.2E+00	h			3.2E+00	r			0	0.10	95-80-7	Toluene-2,4-diamine	1.5E-01	ca	5.4E-01	ca	2.1E-03	ca	2.1E-02	ca		
		6.0E-01	h			6.0E-01	r	0	0.10	95-70-5	Toluene-2,5-diamine	3.7E+04	nc	1.0E+05	max	2.2E+03	nc	2.2E+04	nc		
		2.0E-01	h			2.0E-01	r	0	0.10	823-40-5	Toluene-2,6-diamine	1.2E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc		
2E-01	i			2E-01	r			0	0.10	106-49-0	p-Toluidine	2.6E+00	ca	9.1E+00	ca	3.5E-02	ca	3.5E-01	ca		
1.1E+00	i			1.1E+00	i			0	0.10	8001-35-2	Toxaphene	4.4E-01	ca	1.6E+00	ca	6.0E-03	ca	6.1E-02	ca	3.1E+01	2.0E+00
		7.5E-03	i			7.5E-03	r	0	0.10	66841-25-6	Tralomethrin	4.6E+02	nc	4.6E+03	nc	2.7E+01	nc	2.7E+02	nc		
		1.3E-02	i			1.3E-02	r	0	0.10	2303-17-5	Triallate	7.9E+02	nc	8.0E+03	nc	4.7E+01	nc	4.7E+02	nc		
		1.0E-02	i			1.0E-02	r	0	0.10	82097-50-5	Triasulfuron	6.1E+02	nc	6.2E+03	nc	3.7E+01	nc	3.6E+02	nc		
		5.0E-03	i			5.0E-03	r	0	0.10	615-54-3	1,2,4-Tribromobenzene	3.1E+02	nc	3.1E+03	nc	1.8E+01	nc	1.8E+02	nc		
		3.0E-04	i					0	0.10	56-35-9	Tributyltin oxide (TBTO)	1.8E+01	nc	1.8E+02	nc			1.1E+01	nc		
3.4E-02	h			3.4E-02	r			0	0.10	634-93-5	2,4,6-Trichloroaniline	1.4E+01	ca	5.1E+01	ca	2.0E-01	ca	2.0E+00	ca		
2.9E-02	h			2.9E-02	r			0	0.10	33663-50-2	2,4,6-Trichloroaniline hydrochloride	1.7E+01	ca	5.9E+01	ca	2.3E-01	ca	2.3E+00	ca		
		1.0E-02	i			5.7E-02	h	1		120-82-1	1,2,4-Trichlorobenzene	6.5E+02	nc	3.0E+03	sat	2.1E+02	nc	1.9E+02	nc	5.0E+00	3.0E-01
		2.8E-01	n			6.3E-01	n	1		71-55-6	**1,1,1-Trichloroethane**	1.2E+03	sat	1.2E+03	sat	2.3E+03	nc	3.2E+03	nc	2.0E+00	1.0E-01
5.7E-02	i	4.0E-03	i	5.6E-02	i	4.0E-03	r	1		79-00-5	1,1,2-Trichloroethane	7.3E-01	ca*	1.6E+00	ca*	1.2E-01	ca	2.0E-01	ca	2.0E-02	9.0E-04
4.00E-01	n	3.00E-04	n	4.00E-01	n	1.00E-02	n	1		79-01-6	**Trichloroethylene (TCE)**	5.3E-02	ca	1.1E-01	ca	1.7E-02	ca	2.8E-02	ca	6.0E-02	3.0E-03
		3.0E-01	i			2.0E-01	h	1		75-69-4	Trichlorofluoromethane	3.9E+02	nc	2.0E+03	sat	7.3E+02	nc	1.3E+03	nc		
		1.0E-01	i			1.0E-01	r	0	0.10	95-95-4	2,4,5-Trichlorophenol	6.1E+03	nc	6.2E+04	nc	3.7E+02	nc	3.6E+03	nc	2.7E+02	1.4E+01
1.1E-02	I	1.0E-04	n	1.1E-02	I	1.0E-04	r	0	0.10	88-06-2	**2,4,6-Trichlorophenol**	6.1E+00	nc**	6.2E+01	nc**	3.7E-01	nc**	3.6E+00	nc**	2.0E-01	8.0E-03
7.0E-02				7.0E-02					0.10	88-06-2	**"CAL-Modified PRG"**	6.9E+00	ca	2.5E+01	ca	9.6E-02	ca	9.6E-01	ca		
		1.0E-02	i			1.0E-02	r	0	0.10	93-76-5	2,4,5-Trichlorophenoxyacetic Acid	6.1E+02	nc	6.2E+03	nc	3.7E+01	nc	3.6E+02	nc		
		8.0E-03	i			8.0E-03	r	0	0.10	93-72-1	2-(2,4,5-Trichlorophenoxy) propionic acid	4.9E+02	nc	4.9E+03	nc	2.9E+01	nc	2.9E+02	nc		
		5.0E-03	i			5.0E-03	r	1		598-77-6	1,1,2-Trichloropropane	1.5E+01	nc	5.1E+01	nc	1.8E+01	nc	3.0E+01	nc		
2.0E+00	n	6.0E-03	i	2.0E+00	r	1.4E-03	n	1		96-18-4	**1,2,3-Trichloropropane**	5.0E-03	ca	1.1E-02	ca	3.4E-03	ca	5.6E-03	ca		

Key : SFo,i=Cancer Slope Factor oral, inhalation RfDo,i=Reference Dose oral, inhalation i=IRIS h=HEAST n=NCEA x=Withdrawn o=Other EPA Source r=Route-extrapolation ca=Cancer PRG nc=Noncancer PRG ca* (where: nc < 100X ca) ca**(where: nc < 10X ca)
+++=Non-Standard Method Applied (See Section 2.3 of the "Region 9 PRGs Table User's Guide") sat=Soil Saturation (See Section 4.5) max=Ceiling limit (See Section 2.1) DAF=Dilution Attenuation Factor (See Section 2.5) CAS=Chemical Abstract Services

TOXICITY INFORMATION									CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs) "Direct Contact Exposure Pathways"								SOIL SCREENING LEVELS "Migration to Ground Water"	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		V O C / skin abs. soils / CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
		5.0E-03	h			5.0E-03	r	1 / / 96-19-5	1,2,3-Trichloropropene	1.2E+01	nc	3.8E+01	nc	1.8E+01	nc	3.0E+01	nc		
		3.0E-03	i			3.0E-03	r	0 / 0.10 / 58138-08-2	Tridiphane	1.8E+02	nc	1.8E+03	nc	1.1E+01	nc	1.1E+02	nc		
		2.0E-03	r			2.0E-03	i	1 / / 121-44-8	Triethylamine	2.3E+01	nc	8.6E+01	nc	7.3E+00	nc	1.2E+01	nc		
7.7E-03	i	7.5E-03	i	7.7E-03	r	7.5E-03	r	0 / 0.10 / 1582-09-8	Trifluralin	6.3E+01	ca**	2.2E+02	ca*	8.7E-01	ca*	8.7E+00	ca*		
		1.400E-04	r			1.400E-04	n	/ 0.10 / 552-30-7	Trimellitic Anhydride (TMAN)	8.6E+00	nc	8.6E+01	nc	5.1E-01	nc	5.1E+00			
		5.0E-02	n			1.7E-03	n	1 / / 95-63-6	1,2,4-Trimethylbenzene	5.2E+01	nc	1.7E+02	nc	6.2E+00	nc	1.2E+01	nc		
		5.0E-02	n			1.7E-03	n	1 / / 108-67-8	1,3,5-Trimethylbenzene	2.1E+01	nc	7.0E+01	nc	6.2E+00	nc	1.2E+01	nc		
3.7E-02	h			3.7E-02	r			0 / 0.10 / 512-56-1	Trimethyl phosphate	1.3E+01	ca	4.7E+01	ca	1.8E-01	ca	1.8E+00	ca		
		3.0E-02	i			3.0E-02	r	0 / 0.10 / 99-35-4	1,3,5-Trinitrobenzene	1.8E+03	nc	1.8E+04	nc	1.1E+02	nc	1.1E+03	nc		
		1.0E-02	h			1.0E-02	r	0 / 0.10 / 479-45-8	Trinitrophenylmethylnitramine	6.1E+02	nc	6.2E+03	nc	3.7E+01	nc	3.6E+02	nc		
3E-02	i	5.0E-04	i	3E-02	r	5.0E-04	r	0 / 0.10 / 118-96-7	2,4,6-Trinitrotoluene	1.6E+01	ca**	5.7E+01	ca**	2.2E-01	ca**	2.2E+00	ca**		
		5.00E-03	n			5.00E-03	r	/ 0.10 / 791-28-6	**Triphenylphosphine oxide**	3.1E+02	nc	3.1E+03	nc	1.8E+01	nc	1.8E+02	nc		
3.2E-03	n	1.1E-01	n	3.2E-03	r	1.1E-01	r	/ 0.10 / 115-96-8	**Tris(2-chloroethyl) phosphate**	1.5E+02	ca*	5.4E+02	ca	2.1E+00	ca	2.1E+01	ca		
		2.00E-04	n					/ / 7440-61-0	Uranium (chemical toxicity only)	1.6E+01	nc	2.0E+02	nc			7.3E+00	nc		
		7.0E-03	h					0 / / 7440-62-2	Vanadium and compounds	5.5E+02	nc	7.2E+03	nc			2.6E+02	nc	6.0E+03	3.0E+02
		1.0E-03	i			1.0E-03	r	0 / 0.10 / 1929-77-7	Vernam	6.1E+01	nc	6.2E+02	nc	3.7E+00	nc	3.6E+01	nc		
		2.5E-02	i			2.5E-02	r	0 / 0.10 / 50471-44-8	Vinclozolin	1.5E+03	nc	1.5E+04	nc	9.1E+01	nc	9.1E+02	nc		
		1.0E+00	h			5.7E-02	i	1 / / 108-05-4	Vinyl acetate	4.3E+02	nc	1.4E+03	nc	2.1E+02	nc	4.1E+02	nc	1.7E+02	8.0E+00
1.1E-01	r	8.6E-04	r	1.1E-01	h	8.6E-04	i	1 / / 593-60-2	Vinyl bromide (bromoethene)	1.9E-01	ca*	4.2E-01	ca*	6.1E-02	ca*	1.0E-01	ca*		
1.5E+00	i	3.00E-03	i	3.1E-02	i	2.86E-02	i	1 / / 75-01-4	**Vinyl chloride (child/adult)+++**	7.9E-02	ca			1.1E-01	ca	2.0E-02	ca	1.0E-02	7.0E-04
7.5E-01	i	3.00E-03	i	1.6E-02	i	2.86E-02	i	1 / / 75-01-4	Vinyl chloride (adult)			7.5E-01	ca						
		3.0E-04	i			3.0E-04	r	0 / 0.10 / 81-81-2	Warfarin	1.8E+01	nc	1.8E+02	nc	1.1E+00	nc	1.1E+01	nc		
		7.0E-01	i			2.9E-02	i	1 / 0.10 / 1330-20-7	**Xylenes**	2.7E+02	nc	4.2E+02	sat	1.1E+02	nc	2.1E+02	nc	2.1E+02	1.0E+01
		3.0E-01	i					0 / / 7440-66-6	Zinc	2.3E+04	nc	1.0E+05	max			1.1E+04	nc	1.2E+04	6.2E+02
		3.0E-04	i					0 / / 1314-84-7	Zinc phosphide	2.3E+01	nc	3.1E+02	nc			1.1E+01	nc		
		5.0E-02	i			5.0E-02	r	0 / 0.10 / 12122-67-7	Zineb	3.1E+03	nc	3.1E+04	nc	1.8E+02	nc	1.8E+03	nc		

CONTAMINANT	RESIDENTIAL SOIL								INDUSTRIAL SOIL							
	Cancer Risk = 1E-06				Chronic HQ = 1				Cancer Risk = 1E-06				Chronic HQ = 1			
	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)
Acephate	1.0E+06	2.3E+02	7.4E+01	5.6E+01	8.2E+06	1.1E+03	3.1E+02	2.4E+02	2.2E+06	5.0E+02	3.3E+02	2.0E+02	2.7E+07	6.2E+03	4.1E+03	2.5E+03
Acetaldehyde	1.1E+01			1.1E+01	5.0E+01			5.0E+01	2.3E+01			2.3E+01	1.6E+02			1.6E+02
Acetochlor					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+06	3.1E+04	2.0E+04	1.2E+04
Acetone					2.0E+03		7.8E+03	1.6E+03					6.4E+03		1.0E+05	6.0E+03
Acetone cyanohydrin					1.6E+06	2.2E+02	6.3E+01	4.9E+01					5.4E+06	1.2E+03	6.2E+02	4.9E+02
Acetonitrile					6.2E+02		1.3E+03	4.2E+02					2.0E+03		1.7E+04	1.8E+03
Acrolein					1.0E-01		1.6E+03	1.0E-01					3.4E-01		2.0E+04	3.4E-01
Acrylamide	2.0E+03	4.5E-01	1.4E-01	1.1E-01	4.1E+05	5.6E+01	1.6E+01	1.2E+01	4.2E+03	9.6E-01	6.4E-01	3.6E-01	1.3E+06	3.1E+02	2.0E+02	1.2E+02
Acrylic acid					5.9E+05	1.4E+05	3.9E+04	2.9E+04					1.9E+06	7.7E+05	5.1E+05	2.7E+05
Acrylonitrile	2.5E-01		1.2E+00	2.1E-01	8.0E+00		7.8E+01	7.3E+00	5.4E-01		5.3E+00	4.9E-01	2.6E+01		1.0E+03	2.6E+01
Alachlor	1.1E+05	2.5E+01	6.0E+00	6.0E+00	2.1E+07	2.8E+03	7.8E+02	6.1E+02	2.4E+05	5.4E+01	3.6E+01	2.1E+01	6.7E+07	1.5E+04	1.0E+04	6.2E+03
Alar					3.1E+06	4.2E+04	1.2E+04	9.2E+03					1.0E+09	2.3E+05	1.5E+05	9.2E+04
Aldicarb					2.1E+06	2.8E+02	7.8E+01	6.1E+01					6.7E+06	1.5E+03	1.0E+03	6.2E+02
Aldicarb sulfone					2.1E+06	2.8E+02	7.8E+01	6.1E+01					6.7E+06	1.5E+03	1.0E+03	6.2E+02
Aldrin	5.2E+02	1.2E-01	3.8E-02	2.9E-02	6.2E+04	8.4E+00	2.3E+00	1.8E+00	1.1E+03	2.6E-01	1.7E-01	1.0E-01	2.0E+05	4.6E+01	3.1E+01	1.8E+01
Ally					5.1E+06	7.0E+04	2.0E+04	1.5E+04					1.7E+09	3.9E+05	2.6E+05	1.5E+05
Allyl alcohol					1.0E+07	1.4E+03	3.9E+02	3.1E+02					3.4E+07	7.7E+03	5.1E+03	3.1E+03
Allyl chloride					5.9E+05	1.4E+04	3.9E+03	3.0E+03					1.9E+06	7.7E+04	5.1E+04	3.0E+04
Aluminum					2.9E+06		7.8E+04	7.6E+04					9.4E+06		1.0E+06	9.2E+05
Aluminum phosphide							3.1E+01	3.1E+01							4.1E+02	4.1E+02
Amdro					6.2E+05	8.4E+01	2.3E+01	1.8E+01					2.0E+06	4.6E+02	3.1E+02	1.8E+02
Ametryn					1.9E+07	2.5E+03	7.0E+02	5.5E+02					6.1E+07	1.4E+04	9.2E+03	5.5E+03
m-Aminophenol					1.4E+06	2.0E+04	5.5E+03	4.3E+03					4.7E+06	1.1E+05	7.2E+04	4.3E+04
4-Aminopyridine					4.1E+04	5.6E+00	1.6E+00	1.2E+00					1.3E+05	3.1E+01	2.0E+01	1.2E+01
Amitraz					5.1E+06	7.0E+02	2.0E+02	1.5E+02					1.7E+07	3.9E+03	2.6E+03	1.5E+03
Ammonia																
Ammonium sulfamate						5.6E+04	1.6E+04	1.2E+04						3.1E+05	2.0E+05	1.2E+05
Aniline	1.6E+06	3.5E+02	1.1E+02	8.5E+01	5.9E+05	2.0E+03	5.5E+02	4.3E+02	3.3E+06	7.6E+02	5.0E+02	3.0E+02	1.9E+06	1.1E+04	7.2E+03	4.3E+03
Antimony and compounds							3.1E+01	3.1E+01							4.1E+02	4.1E+02
Antimony pentoxide							3.9E+01	3.9E+01							5.1E+02	5.1E+02
Antimony potassium tartrate							7.0E+01	7.0E+01							9.2E+02	9.2E+02
Antimony tetroxide							3.1E+01	3.1E+01							4.1E+02	4.1E+02
Antimony trioxide					1.2E+05		3.1E+01	3.1E+01					3.8E+05		4.1E+02	4.1E+02
Apollo					2.7E+07	3.6E+03	1.0E+03	7.9E+02					8.7E+07	2.0E+04	1.3E+04	8.0E+03
Aramite	3.6E+05	8.1E+01	2.6E+01	1.9E+01	1.0E+06	1.4E+04	3.9E+03	3.1E+03	7.6E+05	1.7E+02	1.1E+02	8.9E+01	3.4E+06	7.7E+04	5.1E+04	3.1E+04
Arsenic (noncancer endpoint)						2.8E+02	2.3E+01	2.2E+01						1.5E+03	3.1E+02	2.6E+02
Arsenic (cancer endpoint)	5.9E+02	4.5E+00	4.3E-01	3.9E-01		2.8E+02	2.3E+01	2.2E+01	1.3E+03	9.6E+00	1.9E+00	1.6E+00		1.5E+03	3.1E+02	2.6E+02
Arsine																
Assure					1.9E+07	2.5E+03	7.0E+02	5.5E+02					6.1E+07	1.4E+04	9.2E+03	5.5E+03
Asulam					1.0E+06	1.4E+04	3.9E+03	3.1E+03					3.4E+06	7.7E+04	5.1E+04	3.1E+04
Atrazine	4.0E+04	9.1E+00	2.9E+00	2.2E+00	7.2E+07	9.8E+03	2.7E+03	2.1E+03	8.6E+04	2.0E+01	1.3E+01	7.8E+00	2.4E+06	5.4E+04	3.6E+04	2.2E+04
Avermectin B1					8.2E+05	1.1E+02	3.1E+01	2.4E+01					2.7E+06	6.2E+02	4.1E+02	2.5E+02
Azobenzene	8.2E+04	1.8E+01	5.8E+00	4.4E+00					1.7E+05	3.9E+01	2.6E+01	1.6E+01				
Barium and compounds					2.9E+05		5.5E+03	5.4E+03					9.6E+05		7.2E+04	6.7E+04
Baygon					8.2E+06	1.1E+03	3.1E+02	2.4E+02					2.7E+07	6.2E+03	4.1E+03	2.5E+03
Bayleton					8.2E+07	8.4E+03	2.3E+03	1.8E+03					2.0E+08	4.6E+04	3.1E+04	1.8E+04
Baythroid					5.1E+07	7.0E+03	2.0E+03	1.5E+03					1.7E+08	3.9E+04	2.6E+04	1.5E+04
Benefin					8.2E+06	8.4E+04	2.3E+04	1.8E+04					2.0E+09	4.6E+05	3.1E+05	1.8E+05
Benomyl					1.0E+06	1.4E+04	3.8E+03	3.1E+03					3.4E+06	7.7E+04	5.1E+04	3.1E+04
Bentazon					8.2E+07	8.4E+03	2.3E+03	1.8E+03					2.0E+08	4.6E+04	3.1E+04	1.8E+04
Benzaldehyde					2.1E+06	2.8E+04	7.8E+03	6.1E+03					6.7E+06	1.5E+05	1.0E+05	6.2E+04

CONTAMINANT	RESIDENTIAL SOIL								INDUSTRIAL SOIL							
	Cancer Risk = 1E-06				Chronic HQ = 1				Cancer Risk = 1E-06				Chronic HQ = 1			
	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)
Benzene	6.3E-01		1.2E+01	6.0E-01	7.3E+00		2.3E+02	7.1E+00	1.3E+00		5.2E+01	1.3E+00	2.4E+01		3.1E+03	2.4E+01
Benzidine	3.6E+01	8.8E-03	2.8E-03	2.1E-03	6.2E+06	6.4E+02	2.3E+02	1.8E+02	6.2E+01	1.9E-02	1.2E-02	7.5E-03	2.0E+07	4.6E+03	3.1E+03	1.8E+03
Benzoic acid					6.2E+09	1.1E+06	3.1E+05	2.4E+05					2.7E+10	6.2E+06	4.1E+06	2.5E+06
Benzotrichloride	6.6E+02	1.6E-01	4.9E-02	3.7E-02					1.4E+03	3.3E-01	2.2E-01	1.3E-01				
Benzyl alcohol					6.2E+06	6.4E+04	2.3E+04	1.8E+04					2.0E+09	4.6E+05	3.1E+05	1.8E+05
Benzyl chloride	1.2E+00		3.8E+00	8.9E-01	1.3E+02		2.3E+02	8.4E+01	2.5E+00		1.7E+01	2.2E+00	4.4E+02		3.0E+03	3.6E+02
Beryllium and compounds	1.1E+03			1.1E+03	1.2E+04		1.6E+02	1.5E+02	2.2E+03			2.2E+03	3.6E+04		2.0E+03	1.9E+03
Bidrin					2.1E+05	2.8E+01	7.8E+00	6.1E+00					6.7E+05	1.5E+02	1.0E+02	6.2E+01
Biphenthrin (Talstar)					3.1E+07	4.2E+03	1.2E+03	9.2E+02					1.0E+06	2.3E+04	1.5E+04	9.2E+03
1,1-Biphenyl					1.3E+04		3.9E+03	3.0E+03					4.3E+04		5.1E+04	2.3E+04
Bis(2-chloroethyl)ether	3.3E-01		5.8E-01	2.1E-01					7.0E-01		2.6E+00	5.5E-01				
Bis(2-chloroisopropyl)ether	4.2E+00		9.1E+00	2.9E+00	1.4E+03		3.1E+03	9.5E+02	9.0E+00		4.1E+01	7.4E+00	4.5E+03		4.1E+04	4.0E+03
Bis(chloromethyl)ether	2.1E-04		2.9E-03	1.9E-04					4.4E-04		1.3E-02	4.3E-04				
Bis(2-chloro-1-methylethyl)ether	4.2E+00		9.1E+00	2.9E+00	1.4E+03		3.1E+03	9.5E+02	9.0E+00		4.1E+01	7.4E+00	4.5E+03		4.1E+04	4.0E+03
Bis(2-ethylhexyl)phthalate (DEHP)	6.3E+05	1.4E+02	4.6E+01	3.5E+01	4.5E+07	5.6E+03	1.6E+03	1.2E+03	1.3E+06	3.1E+02	2.0E+02	1.2E+02	1.5E+06	3.1E+04	2.0E+04	1.2E+04
Bisphenol A					1.0E+06	1.4E+04	3.9E+03	3.1E+03					3.4E+06	7.7E+04	5.1E+04	3.1E+04
Boron					1.2E+07		1.6E+04	1.6E+04					3.8E+07		2.0E+05	2.0E+05
Boron trifluoride																
Bromate							3.1E+02	3.1E+02							4.1E+03	4.1E+03
Bromobenzene					2.8E+01		1.6E+03	2.8E+01					9.3E+01		2.0E+04	9.2E+01
Bromodichloromethane	9.0E-01		1.0E+01	6.2E-01	2.8E+02		1.6E+03	2.2E+02	1.9E+00		4.6E+01	1.8E+00	8.4E+02		2.0E+04	8.1E+02
Bromoform (tribromomethane)	2.3E+06	2.6E+02	8.1E+01	6.2E+01	4.1E+07	5.6E+03	1.6E+03	1.2E+03	4.9E+06	5.5E+02	3.6E+02	2.2E+02	1.3E+06	3.1E+04	2.0E+04	1.2E+04
Bromomethane					4.0E+00		1.1E+02	3.9E+00					1.3E+01		1.4E+03	1.3E+01
Bromophos					1.0E+07	1.4E+03	3.9E+02	3.1E+02					3.4E+07	7.7E+03	5.1E+03	3.1E+03
Bromoxynil					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+06	3.1E+04	2.0E+04	1.2E+04
Bromoxynil octanoate					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+06	3.1E+04	2.0E+04	1.2E+04
1,3-Butadiene	6.6E-03		6.5E-01	6.5E-03					1.4E-02		2.9E+00	1.4E-02				
1-Butanol					5.4E+06	2.8E+04	7.8E+03	6.1E+03					1.7E+07	1.5E+05	1.0E+05	6.1E+04
Butylate					1.0E+06	1.4E+04	3.9E+03	3.1E+03					3.4E+06	7.7E+04	5.1E+04	3.1E+04
n-Butylbenzene					7.1E+02		3.1E+03	5.6E+02					2.3E+03		4.1E+04	2.2E+03
sec-Butylbenzene					5.2E+02		3.1E+03	4.5E+02					1.7E+03		4.1E+04	1.6E+03
tert-Butylbenzene					6.3E+02		3.1E+03	5.3E+02					2.1E+03		4.1E+04	2.0E+03
Butyl benzyl phthalate					4.1E+06	5.6E+04	1.6E+04	1.2E+04					1.3E+09	3.1E+05	2.0E+05	1.2E+05
Butylphthalyl butylglycolate					2.1E+09	2.8E+05	7.8E+04	6.1E+04					6.7E+09	1.5E+06	1.0E+06	6.2E+05
Cacodylic acid	3.5E+04	8.1E+00	2.8E+00	1.9E+00	6.2E+05	8.4E+01	2.3E+01	1.8E+01	7.5E+04	1.7E+01	1.1E+01	6.9E+00	2.0E+06	4.6E+02	3.1E+02	1.8E+02
Cadmium and compounds	1.4E+03			1.4E+03		7.0E+02	3.9E+01	3.7E+01	3.0E+03			3.0E+03		3.9E+03	5.1E+02	4.5E+02
Caprolactam					1.0E+09	1.4E+05	3.9E+04	3.1E+04					3.4E+09	7.7E+05	5.1E+05	3.1E+05
Captafol	1.0E+06	2.4E+02	7.4E+01	5.7E+01	4.1E+06	5.6E+02	1.6E+02	1.2E+02	2.2E+06	5.0E+02	3.3E+02	2.0E+02	1.3E+07	3.1E+03	2.0E+03	1.2E+03
Captan	2.5E+06	5.8E+02	1.8E+02	1.4E+02	2.7E+08	3.6E+04	1.0E+04	7.9E+03	5.4E+06	1.2E+03	8.2E+02	4.9E+02	6.7E+08	2.0E+05	1.3E+05	8.0E+04
Carbaryl					2.3E+06	2.8E+04	7.8E+03	6.1E+03					7.4E+06	1.5E+05	1.0E+05	6.2E+04
Carbazole	4.4E+05	1.0E+02	3.2E+01	2.4E+01					9.4E+05	2.2E+02	1.4E+02	8.6E+01				
Carbofuran					1.0E+07	1.4E+03	3.9E+02	3.1E+02					3.4E+07	7.7E+03	5.1E+03	3.1E+03
Carbon disulfide					3.7E+02		7.8E+03	3.6E+02					1.2E+03		1.0E+05	1.2E+03
Carbon tetrachloride	2.6E-01		4.9E+00	2.5E-01	2.3E+00		5.5E+01	2.2E+00	5.6E-01		2.2E+01	5.5E-01	7.4E+00		7.2E+02	7.3E+00
Carbosulfan					2.1E+07	2.8E+03	7.8E+02	6.1E+02					6.7E+07	1.5E+04	1.0E+04	6.2E+03
Carboxin					2.1E+08	2.8E+04	7.8E+03	6.1E+03					6.7E+08	1.5E+05	1.0E+05	6.2E+04
Chloramben					3.1E+07	4.2E+03	1.2E+03	9.2E+02					1.0E+08	2.3E+04	1.5E+04	9.2E+03
Chloranil	2.2E+04	5.0E+00	1.6E+00	1.2E+00					4.7E+04	1.1E+01	7.1E+00	4.3E+00				
Chlordane	2.5E+04	1.4E+01	1.8E+00	1.8E+00	4.1E+05	3.5E+02	3.9E+01	3.5E+01	5.4E+04	3.1E+01	8.2E+00	6.5E+00	1.3E+06	1.9E+03	5.1E+02	4.0E+02
Chlorimuron-ethyl					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+08	3.1E+04	2.0E+04	1.2E+04

CONTAMINANT	RESIDENTIAL SOIL								INDUSTRIAL SOIL							
	Cancer Risk = 1E-06				Chronic HQ = 1				Cancer Risk = 1E-06				Chronic HQ = 1			
	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)
Chlorine																
Chlorine dioxide																
Chloroacetic acid					4.1E+05	5.6E+02	1.6E+02	1.2E+02					1.3E+07	3.1E+03	2.0E+03	1.2E+03
2-Chloroacetophenone					3.4E-02		6.7E-01	3.3E-02					1.1E-01		6.6E+00	1.1E-01
4-Chloroaniline					6.2E+06	1.1E+03	3.1E+02	2.4E+02					2.7E+07	6.2E+03	4.1E+03	2.5E+03
Chlorobenzene					1.7E+02		1.6E+03	1.5E+02					5.4E+02		2.0E+04	5.3E+02
Chlorobenzilate	3.3E+04	7.5E+00	2.4E+00	1.8E+00	4.1E+07	5.6E+03	1.6E+03	1.2E+03	7.0E+04	1.6E+01	1.1E+01	6.4E+00	1.3E+06	3.1E+04	2.0E+04	1.2E+04
p-Chlorobenzoic acid					4.1E+08	5.6E+04	1.6E+04	1.2E+04					1.3E+09	3.1E+05	2.0E+05	1.2E+05
4-Chlorobenzotrifluoride					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+06	3.1E+04	2.0E+04	1.2E+04
2-Chloro-1,3-butadiene					3.6E+00		1.6E+03	3.6E+00					1.2E+01		2.0E+04	1.2E+01
1-Chlorobutane					7.3E+02		3.1E+04	7.1E+02					2.4E+03		4.1E+05	2.4E+03
1-Chloro-1,1-difluoroethane					2.4E+04		1.1E+06	2.3E+04					7.7E+04		1.5E+07	7.7E+04
Chlorodifluoromethane					2.3E+04		1.1E+06	2.3E+04					7.6E+04		1.4E+07	7.5E+04
Chloroethane	3.1E+00		2.2E+02	3.0E+00	5.9E+03		3.1E+04	5.0E+03	6.5E+00		9.9E+02	6.5E+00	1.9E+04		4.1E+05	1.8E+04
Chloroform					3.6E+00		7.8E+02	3.6E+00					1.2E+01		1.0E+04	1.2E+01
"CAL-Modified PRG"	9.4E-01			9.4E-01					2.0E+00			2.0E+00				
Chloromethane	1.3E+00		4.9E+01	1.2E+00					2.7E+00		2.2E+02	2.6E+00				
4-Chloro-2-methylaniline	1.5E+04	3.5E+00	1.1E+00	8.4E-01					3.2E+04	7.5E+00	4.9E+00	3.0E+00				
4-Chloro-2-methylaniline hydrochloride	1.9E+04	4.4E+00	1.4E+00	1.1E+00					4.1E+04	9.4E+00	6.2E+00	3.7E+00				
beta-Chloronaphthalene					2.3E+04		6.3E+03	4.9E+03					3.3E+04		6.2E+04	2.3E+04
o-Chloronitrobenzene	3.1E+01		6.6E+01	2.1E+01	1.4E+00		7.8E+01	1.4E+00	6.5E+01		3.0E+02	5.3E+01	4.5E+00		1.0E+03	4.5E+00
p-Chloronitrobenzene	4.4E+01		9.6E+01	3.0E+01	1.2E+01		7.8E+01	1.0E+01	9.4E+01		4.3E+02	7.7E+01	3.8E+01		1.0E+03	3.7E+01
2-Chlorophenol					7.6E+01		3.9E+02	6.3E+01					2.5E+02		5.1E+03	2.4E+02
2-Chloropropane					1.8E+02		2.3E+03	1.7E+02					6.0E+02		3.0E+04	5.9E+02
Chlorothalonil	8.0E+05	1.8E+02	5.8E+01	4.4E+01	3.1E+07	4.2E+03	1.2E+03	9.2E+02	1.7E+06	3.9E+02	2.6E+02	1.6E+02	1.0E+06	2.3E+04	1.5E+04	9.2E+03
o-Chlorotoluene					1.8E+02		1.6E+03	1.6E+02					5.8E+02		2.0E+04	5.6E+02
Chlorpropham					4.1E+06	5.6E+04	1.6E+04	1.2E+04					1.3E+09	3.1E+05	2.0E+05	1.2E+05
Chlorpyrifos					6.2E+06	8.4E+02	2.3E+02	1.8E+02					2.0E+07	4.6E+03	3.1E+03	1.8E+03
Chlorpyrifos-methyl					2.1E+07	2.8E+03	7.8E+02	6.1E+02					6.7E+07	1.5E+04	1.0E+04	6.2E+03
Chlorsulfuron					1.0E+08	1.4E+04	3.9E+03	3.1E+03					3.4E+08	7.7E+04	5.1E+04	3.1E+04
Chlorthiophos					1.6E+06	2.2E+02	6.3E+01	4.9E+01					5.4E+06	1.2E+03	8.2E+02	4.9E+02
Total Chromium (1:6 ratio Cr VI:Cr III)+++	2.1E+02			2.1E+02					4.5E+02			4.5E+02				
Chromium III							1.2E+05	1.2E+05							1.5E+06	1.5E+06
Chromium VI+++	3.0E+01			3.0E+01	4.5E+03		2.3E+02	2.2E+02	6.4E+01			6.4E+01	1.5E+04		3.1E+03	2.5E+03
Cobalt	9.0E+02			9.0E+02	1.2E+04		1.6E+03	1.4E+03	1.9E+03			1.9E+03	3.8E+04		2.0E+04	1.3E+04
Coke Oven Emissions	4.1E+03			4.1E+03					8.7E+03			8.7E+03				
Copper and compounds							3.1E+03	3.1E+03							4.1E+04	4.1E+04
Crotonaldehyde	5.4E-03		3.4E-01	5.3E-03					1.1E-02			1.1E-02				
Cumene (isopropylbenzene)					6.2E+02		7.8E+03	5.7E+02					2.0E+03		1.0E+05	2.0E+03
Cyanazine	1.1E+04	2.4E+00	7.6E-01	5.8E-01	4.1E+06	5.6E+02	1.6E+02	1.2E+02	2.2E+04	5.2E+00	3.4E+00	2.1E+00	1.3E+07	3.1E+03	2.0E+03	1.2E+03
Cyanide (free)						5.6E+03	1.6E+03	1.2E+03						3.1E+04	2.0E+04	1.2E+04
Cyanide (hydrogen)					1.1E+01		1.6E+03	1.1E+01					3.5E+01		2.0E+04	3.5E+01
Cyanogen					1.3E+02		3.1E+03	1.3E+02					4.3E+02		4.1E+04	4.3E+02
Cyanogen bromide					3.0E+02		7.0E+03	2.9E+02					9.8E+02		9.2E+04	9.7E+02
Cyanogen chloride					1.7E+02		3.8E+03	1.6E+02					5.4E+02		5.1E+04	5.4E+02
Cyclohexane					9.7E+03		4.5E+05	9.5E+03					3.2E+04		5.8E+06	3.2E+04
Cyclohexanone					1.0E+10	1.4E+06	3.9E+05	3.1E+05					3.4E+10	7.7E+06	5.1E+06	3.1E+06
Cyclohexylamine					4.1E+06	5.6E+04	1.6E+04	1.2E+04					1.3E+09	3.1E+05	2.0E+05	1.2E+05
Cyhalothrin/Karate					1.0E+07	1.4E+03	3.9E+02	3.1E+02					3.4E+07	7.7E+03	5.1E+03	3.1E+03
Cypermethrin					2.1E+07	2.8E+03	7.8E+02	6.1E+02					6.7E+07	1.5E+04	1.0E+04	6.2E+03
Cyromazine					1.5E+07	2.1E+03	5.9E+02	4.6E+02					6.0E+07	1.2E+04	7.7E+03	4.6E+03

CONTAMINANT	RESIDENTIAL SOIL								INDUSTRIAL SOIL							
	Cancer Risk = 1E-06				Chronic HQ = 1				Cancer Risk = 1E-06				Chronic HQ = 1			
	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)
Dacthal					2.1E+07	2.6E+03	7.8E+02	6.1E+02					6.7E+07	1.5E+04	1.0E+04	6.2E+03
Dalapon					6.2E+07	6.4E+03	2.3E+03	1.8E+03					2.0E+08	4.6E+04	3.1E+04	1.8E+04
Danitol					5.1E+07	7.0E+03	2.0E+03	1.5E+03					1.7E+08	3.9E+04	2.6E+04	1.5E+04
DDD	3.7E+04	2.8E+01	2.7E+00	2.4E+00					7.8E+04	6.0E+01	1.2E+01	1.0E+01				
DDE	2.6E+04	2.0E+01	1.9E+00	1.7E+00					5.5E+04	4.3E+01	8.4E+00	7.0E+00				
DDT	2.6E+04	2.0E+01	1.9E+00	1.7E+00	1.0E+06	4.7E+02	3.9E+01	3.6E+01	5.5E+04	4.3E+01	8.4E+00	7.0E+00	3.4E+06	2.6E+03	5.1E+02	4.3E+02
Decabromodiphenyl ether					2.1E+07	2.6E+03	7.8E+02	6.1E+02					6.7E+07	1.5E+04	1.0E+04	6.2E+03
Demeton					6.2E+04	1.1E+01	3.1E+00	2.4E+00					2.7E+05	6.2E+01	4.1E+01	2.5E+01
Diallate	1.5E+05	3.3E+01	1.0E+01	8.0E+00					3.1E+05	7.1E+01	4.7E+01	2.8E+01				
Diazinon					1.9E+06	2.5E+02	7.0E+01	5.5E+01					6.1E+06	1.4E+03	9.2E+02	5.5E+02
Dibenzofuran					4.1E+03		3.1E+02	2.9E+02					1.3E+04		4.1E+03	3.1E+03
1,4-Dibromobenzene					2.1E+07	2.6E+03	7.8E+02	6.1E+02					6.7E+07	1.5E+04	1.0E+04	6.2E+03
Dibromochloromethane	1.3E+00		7.6E+00	1.1E+00	5.1E+02		1.6E+03	3.8E+02	2.8E+00		3.4E+01	2.6E+00	1.7E+03		2.0E+04	1.5E+03
1,2-Dibromo-3-chloropropane	7.1E+01		4.6E-01	4.5E-01	2.3E+00		4.5E+00	1.5E+00	1.5E+02		2.0E+00	2.0E+00	7.4E+00		5.8E+01	6.6E+00
"CAL-Modified PRG"	2.4E-02		9.1E-02	1.9E-02					5.2E-02		4.1E-01	4.6E-02				
1,2-Dibromoethane	8.0E-02		7.5E-03	6.9E-03	6.2E-01		4.5E+00	6.9E-01	1.7E-01		3.4E-02	2.6E-02	2.7E+00		5.8E+01	2.6E+00
Dibutyl phthalate					2.1E+06	2.6E+04	7.8E+03	6.1E+03					6.7E+06	1.5E+05	1.0E+05	6.2E+04
Dicamba					6.2E+07	6.4E+03	2.3E+03	1.8E+03					2.0E+08	4.6E+04	3.1E+04	1.8E+04
1,2-Dichlorobenzene					1.3E+03		7.0E+03	1.1E+03					4.3E+03		9.2E+04	4.1E+03
1,3-Dichlorobenzene					2.1E+01		7.0E+01	1.6E+01					6.7E+01		9.2E+02	6.3E+01
1,4-Dichlorobenzene	4.0E+00		2.7E+01	3.4E+00	6.1E+02		2.3E+03	4.8E+02	8.4E+00		1.2E+02	7.9E+00	2.0E+03		3.1E+04	1.9E+03
3,3-Dichlorobenzidine	2.0E+04	4.5E+00	1.4E+00	1.1E+00					4.2E+04	9.6E+00	6.4E+00	3.8E+00				
4,4'-Dichlorobenzophenone					6.2E+07	6.4E+03	2.3E+03	1.8E+03					2.0E+08	4.6E+04	3.1E+04	1.8E+04
1,4-Dichloro-2-butene	8.9E-03		6.9E-02	7.9E-03					1.9E-02		3.1E-01	1.8E-02				
Dichlorodifluoromethane					9.4E+01		1.6E+04	9.4E+01					3.1E+02		2.0E+05	3.1E+02
1,1-Dichloroethane					5.4E+02		7.8E+03	5.1E+02					1.8E+03		1.0E+05	1.7E+03
"CAL-Modified PRG"	2.9E+00		1.1E+02	2.8E+00					6.1E+00		5.0E+02	6.0E+00				
1,2-Dichloroethane	2.9E-01		7.0E+00	2.8E-01	8.8E+00		2.3E+03	8.5E+00	6.2E-01		3.1E+01	6.0E-01	2.8E+01		3.1E+04	2.8E+01
1,1-Dichloroethylene					1.3E+02		3.9E+03	1.2E+02					4.2E+02		5.1E+04	4.1E+02
1,2-Dichloroethylene (cis)					4.5E+01		7.8E+02	4.3E+01					1.5E+02		1.0E+04	1.5E+02
1,2-Dichloroethylene (trans)					7.3E+01		1.6E+03	6.9E+01					2.4E+02		2.0E+04	2.3E+02
2,4-Dichlorophenol					6.2E+06	6.4E+02	2.3E+02	1.8E+02					2.0E+07	4.6E+03	3.1E+03	1.8E+03
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)					1.6E+07	2.2E+03	6.3E+02	4.9E+02					5.4E+07	1.2E+04	8.2E+03	4.9E+03
2,4-Dichlorophenoxyacetic Acid (2,4-D)					2.1E+07	5.6E+03	7.8E+02	5.9E+02					6.7E+07	3.1E+04	1.0E+04	7.7E+03
1,2-Dichloropropane	3.6E-01		9.4E+00	3.4E-01	6.4E+00		6.6E+01	6.0E+00	7.6E-01		4.2E+01	7.4E-01	2.1E+01		1.1E+03	2.1E+01
1,3-Dichloropropene	6.8E-01		6.4E+00	7.8E-01	1.6E+01		2.3E+03	1.6E+01	1.9E+00		2.9E+01	1.8E+00	5.4E+01		3.1E+04	5.4E+01
2,3-Dichloropropanol					6.2E+06	6.4E+02	2.3E+02	1.8E+02					2.0E+07	4.6E+03	3.1E+03	1.8E+03
Dichlorvos	3.1E+04	7.0E+00	2.2E+00	1.7E+00	2.9E+05	1.4E+02	3.9E+01	3.1E+01	6.5E+04	1.5E+01	9.9E+00	5.9E+00	9.6E+05	7.7E+02	5.1E+02	3.1E+02
Dicofol	2.0E+04	4.6E+00	1.5E+00	1.1E+00					4.3E+04	9.9E+00	6.5E+00	3.9E+00				
Dicyclopentadiene					5.4E-01		2.3E+03	5.4E-01					1.8E+00		3.1E+04	1.8E+00
Dieldrin	5.5E+02	1.3E-01	4.0E-02	3.0E-02	1.0E+05	1.4E+01	3.9E+00	3.1E+00	1.2E+03	2.7E-01	1.8E-01	1.1E-01	3.4E+05	7.7E+01	5.1E+01	3.1E+01
Diethylene glycol, monobutyl ether					1.2E+07	2.6E+03	7.8E+02	6.1E+02					3.8E+07	1.5E+04	1.0E+04	6.2E+03
Diethylene glycol, monomethyl ether					1.6E+06	1.7E+04	4.7E+03	3.7E+03					5.8E+06	9.3E+04	6.1E+04	3.7E+04
Diethylformamide					6.2E+06	1.1E+03	3.1E+02	2.4E+02					2.7E+07	6.2E+03	4.1E+03	2.5E+03
Di(2-ethylhexyl)adipate	7.4E+06	1.7E+03	5.3E+02	4.1E+02	1.2E+09	1.7E+05	4.7E+04	3.7E+04	1.6E+07	3.6E+03	2.4E+03	1.4E+03	4.0E+09	9.3E+05	6.1E+05	3.7E+05
Diethyl phthalate					1.6E+09	2.2E+05	6.3E+04	4.9E+04					5.4E+09	1.2E+06	8.2E+05	4.9E+05
Diethylstilbestrol	1.6E+00	4.3E-04	1.4E-04	1.0E-04					4.0E+00	9.2E-04	6.1E-04	3.7E-04				
Difenzoquat (Avenge)					1.6E+06	2.2E+04	6.3E+03	4.9E+03					5.4E+06	1.2E+05	8.2E+04	4.9E+04
Diflubenzuron					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+08	3.1E+04	2.0E+04	1.2E+04
1,1-Difluoroethane																
Diisononyl phthalate					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+08	3.1E+04	2.0E+04	1.2E+04

CONTAMINANT	RESIDENTIAL SOIL								INDUSTRIAL SOIL							
	Cancer Risk = 1E-06				Chronic HQ = 1				Cancer Risk = 1E-06				Chronic HQ = 1			
	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)
Diisopropyl methylphosphonate					1.6E+06	2.2E+04	6.3E+03	4.9E+03					5.4E+06	1.2E+05	8.2E+04	4.9E+04
Dimethipin					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+06	3.1E+04	2.0E+04	1.2E+04
Dimethoate					4.1E+05	5.6E+01	1.6E+01	1.2E+01					1.3E+06	3.1E+02	2.0E+02	1.2E+02
3,3'-Dimethoxybenzidine	6.3E+05	1.4E+02	4.6E+01	3.5E+01					1.3E+06	3.1E+02	2.0E+02	1.2E+02				
Dimethylamine					7.9E-02		4.5E-01	6.7E-02					2.6E-01		5.8E+00	2.5E-01
N-N-Dimethylaniline					4.1E+06	5.6E+02	1.6E+02	1.2E+02					1.3E+07	3.1E+03	2.0E+03	1.2E+03
2,4-Dimethylaniline	1.2E+04	2.7E+00	6.5E-01	6.5E-01					2.5E+04	5.8E+00	3.8E+00	2.3E+00				
2,4-Dimethylaniline hydrochloride	1.5E+04	3.5E+00	1.1E+00	8.4E-01					3.2E+04	7.5E+00	4.9E+00	3.0E+00				
3,3'-Dimethylbenzidine	9.6E+02	2.2E-01	7.0E-02	5.3E-02					2.0E+03	4.7E-01	3.1E-01	1.9E-01				
N,N-Dimethylformamide					1.8E+07	2.8E+04	7.8E+03	6.1E+03					5.8E+07	1.5E+05	1.0E+05	6.2E+04
Dimethylphenethylamine					2.1E+06	2.8E+02	7.8E+01	6.1E+01					6.7E+06	1.5E+03	1.0E+03	6.2E+02
2,4-Dimethylphenol					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+06	3.1E+04	2.0E+04	1.2E+04
2,6-Dimethylphenol					1.2E+06	1.7E+02	4.7E+01	3.7E+01					4.0E+06	9.3E+02	6.1E+02	3.7E+02
3,4-Dimethylphenol					2.1E+06	2.8E+02	7.8E+01	6.1E+01					6.7E+06	1.5E+03	1.0E+03	6.2E+02
Dimethyl phthalate					2.1E+10	2.8E+06	7.8E+05	6.1E+05					6.7E+10	1.5E+07	1.0E+07	6.2E+06
Dimethyl terephthalate					2.1E+06	2.8E+04	7.8E+03	6.1E+03					6.7E+06	1.5E+05	1.0E+05	6.2E+04
4,6-Dinitro-o-cyclohexyl phenol					4.1E+06	5.6E+02	1.6E+02	1.2E+02					1.3E+07	3.1E+03	2.0E+03	1.2E+03
1,2-Dinitrobenzene					2.1E+05	2.8E+01	7.8E+00	6.1E+00					6.7E+05	1.5E+02	1.0E+02	6.2E+01
1,3-Dinitrobenzene					2.1E+05	2.8E+01	7.8E+00	6.1E+00					6.7E+05	1.5E+02	1.0E+02	6.2E+01
1,4-Dinitrobenzene					2.1E+05	2.8E+01	7.8E+00	6.1E+00					6.7E+05	1.5E+02	1.0E+02	6.2E+01
2,4-Dinitrophenol					4.1E+06	5.6E+02	1.6E+02	1.2E+02					1.3E+07	3.1E+03	2.0E+03	1.2E+03
Dinitrotoluene mixture	1.3E+04	3.0E+00	9.4E-01	7.2E-01					2.8E+04	6.4E+00	4.2E+00	2.5E+00				
2,4-Dinitrotoluene					4.1E+06	5.6E+02	1.6E+02	1.2E+02					1.3E+07	3.1E+03	2.0E+03	1.2E+03
2,6-Dinitrotoluene					2.1E+06	2.8E+02	7.8E+01	6.1E+01					6.7E+06	1.5E+03	1.0E+03	6.2E+02
Dinoseb					2.1E+06	2.8E+02	7.8E+01	6.1E+01					6.7E+06	1.5E+03	1.0E+03	6.2E+02
di-n-Octyl phthalate					8.2E+07	1.1E+04	3.1E+03	2.4E+03					2.7E+06	6.2E+04	4.1E+04	2.5E+04
1,4-Dioxane	8.0E+05	1.8E+02	5.8E+01	4.4E+01					1.7E+06	3.9E+02	2.6E+02	1.6E+02				
Dioxin (2,3,7,8-TCDD)	5.9E-02	4.5E-05	4.3E-06	3.9E-06					1.3E-01	9.6E-05	1.9E-05	1.6E-05				
Diphenamid					6.2E+07	8.4E+03	2.3E+03	1.8E+03					2.0E+06	4.6E+04	3.1E+04	1.8E+04
Diphenylamine					5.1E+07	7.0E+03	2.0E+03	1.5E+03					1.7E+06	3.9E+04	2.6E+04	1.5E+04
N,N-Diphenyl-1,4 benzenediamine (DPPD)					6.2E+05	8.4E+01	2.3E+01	1.8E+01					2.0E+06	4.6E+02	3.1E+02	1.8E+02
1,2-Diphenylhydrazine	1.1E+04	2.5E+00	8.0E-01	6.1E-01					2.4E+04	5.4E+00	3.6E+00	2.2E+00				
Diphenyl sulfone					6.2E+06	8.4E+02	2.3E+02	1.8E+02					2.0E+07	4.6E+03	3.1E+03	1.8E+03
Diquat					4.5E+06	6.1E+02	1.7E+02	1.3E+02					1.5E+07	3.4E+03	2.2E+03	1.4E+03
Direct black 38	1.0E+03	2.4E-01	7.4E-02	5.7E-02					2.2E+03	5.0E-01	3.3E-01	2.0E-01				
Direct blue 6	1.1E+03	2.5E-01	7.9E-02	6.0E-02					2.3E+03	5.4E-01	3.5E-01	2.1E-01				
Direct brown 95	9.5E+02	2.2E-01	6.9E-02	5.2E-02					2.0E+03	4.7E-01	3.1E-01	1.9E-01				
Disulfoton					8.2E+04	1.1E+01	3.1E+00	2.4E+00					2.7E+05	6.2E+01	4.1E+01	2.5E+01
1,4-Dithiane					2.1E+07	2.8E+03	7.8E+02	6.1E+02					6.7E+07	1.5E+04	1.0E+04	6.2E+03
Diuron					4.1E+06	5.6E+02	1.6E+02	1.2E+02					1.3E+07	3.1E+03	2.0E+03	1.2E+03
Dodine					8.2E+06	1.1E+03	3.1E+02	2.4E+02					2.7E+07	6.2E+03	4.1E+03	2.5E+03
Dysprosium							1.6E+04	1.6E+04							2.0E+05	2.0E+05
Endosulfan					1.2E+07	1.7E+03	4.7E+02	3.7E+02					4.0E+07	9.3E+03	6.1E+03	3.7E+03
Endothall					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+06	3.1E+04	2.0E+04	1.2E+04
Endrin					8.2E+05	8.4E+01	2.3E+01	1.8E+01					2.0E+06	4.6E+02	3.1E+02	1.8E+02
Epichlorohydrin	2.8E+01		6.5E+01	2.0E+01	7.9E+00		1.6E+02	7.6E+00	6.1E+01		2.9E+02	5.0E+01	2.6E+01		2.0E+03	2.6E+01
1,2-Epoxybutane					1.2E+07	1.6E+03	4.5E+02	3.5E+02					3.8E+07	8.8E+03	5.8E+03	3.5E+03
EPTC (S-Ethyl dipropylthiocarbamate)					5.1E+07	7.0E+03	2.0E+03	1.5E+03					1.7E+06	3.9E+04	2.6E+04	1.5E+04
Ethephon (2-chloroethyl phosphonic acid)					1.0E+07	1.4E+03	3.9E+02	3.1E+02					3.4E+07	7.7E+03	5.1E+03	3.1E+03
Ethion					1.0E+06	1.4E+02	3.9E+01	3.1E+01					3.4E+06	7.7E+02	5.1E+02	3.1E+02
2-Ethoxyethanol					1.2E+06	1.1E+05	3.1E+04	2.4E+04					3.8E+06	6.2E+05	4.1E+05	2.5E+05

CONTAMINANT	RESIDENTIAL SOIL							INDUSTRIAL SOIL						
	Cancer Risk = 1E-06				Chronic HQ = 1				Cancer Risk = 1E-06				Chronic HQ = 1			
	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)
2-Ethoxyethanol acetate					6.2E+06	8.4E+04	2.3E+04	1.8E+04					2.0E+09	4.6E+05	3.1E+05	1.8E+05
Ethyl acetate					2.5E+04		7.0E+04	1.9E+04					8.3E+04		9.2E+05	7.6E+04
Ethyl acrylate	2.1E-01		1.3E+01	2.1E-01					4.6E-01		6.0E+01	4.5E-01				
Ethylbenzene	9.4E+00		1.7E+02	8.9E+00	2.4E+03		7.6E+03	1.9E+03	2.0E+01		7.4E+02	2.0E+01	8.0E+03		1.0E+05	7.4E+03
Ethyl chloride	3.1E+00		2.2E+02	3.0E+00	5.9E+03		3.1E+04	5.0E+03	6.5E+00		9.9E+02	6.5E+00	1.9E+04		4.1E+05	1.8E+04
Ethylene cyanohydrin					6.2E+06	8.4E+04	2.3E+04	1.8E+04					2.0E+09	4.6E+05	3.1E+05	1.8E+05
Ethylene diamine					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+06	3.1E+04	2.0E+04	1.2E+04
Ethylene glycol					4.1E+09	5.6E+05	1.6E+05	1.2E+05					1.3E+10	3.1E+06	2.0E+06	1.2E+06
Ethylene glycol, monobutyl ether					7.6E+09	1.4E+05	3.9E+04	3.1E+04					2.5E+10	7.7E+05	5.1E+05	3.1E+05
Ethylene oxide	1.8E-01		6.3E-01	1.4E-01					3.8E-01		2.6E+00	3.4E-01				
Ethylene thiourea (ETU)	6.0E+04	1.6E+01	5.6E+00	4.4E+00	1.6E+05	2.2E+01	6.3E+00	4.9E+00	1.7E+05	3.8E+01	2.6E+01	1.6E+01	5.4E+05	1.2E+02	8.2E+01	4.9E+01
Ethyl ether					1.2E+04		1.6E+04	6.8E+03					3.9E+04		2.0E+05	3.3E+04
Ethyl methacrylate					2.1E+02		7.0E+03	2.1E+02					7.0E+02		9.2E+04	7.0E+02
Ethyl p-nitrophenyl phenylphosphorothioate					2.1E+04	2.6E+00	7.6E-01	6.1E-01					6.7E+04	1.5E+01	1.0E+01	6.2E+00
Ethylphthalyl ethyl glycolate					6.2E+09	8.4E+05	2.3E+05	1.8E+05					2.0E+10	4.6E+06	3.1E+06	1.8E+06
Express					1.6E+07	2.2E+03	6.3E+02	4.9E+02					5.4E+07	1.2E+04	8.2E+03	4.9E+03
Fenamiphos					5.1E+05	7.0E+01	2.0E+01	1.5E+01					1.7E+06	3.9E+02	2.6E+02	1.5E+02
Fluometuron					2.7E+07	3.6E+03	1.0E+03	7.9E+02					8.7E+07	2.0E+04	1.3E+04	8.0E+03
Fluoride						1.7E+04	4.7E+03	3.7E+03						9.3E+04	6.1E+04	3.7E+04
Fluoridone					1.6E+06	2.2E+04	6.3E+03	4.9E+03					5.4E+06	1.2E+05	8.2E+04	4.9E+04
Flurprimidol					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+06	3.1E+04	2.0E+04	1.2E+04
Flutolanil					1.0E+09	1.7E+04	4.7E+03	3.7E+03					4.0E+06	9.3E+04	6.1E+04	3.7E+04
Fluvalinate					2.1E+07	2.6E+03	7.6E+02	6.1E+02					6.7E+07	1.5E+04	1.0E+04	6.2E+03
Folpet	2.5E+06	5.6E+02	1.8E+02	1.4E+02	2.1E+08	2.6E+04	7.6E+03	6.1E+03	5.4E+06	1.2E+03	8.2E+02	4.9E+02	6.7E+08	1.5E+05	1.0E+05	6.2E+04
Fomesafen	4.7E+04	1.1E+01	3.4E+00	2.6E+00					9.9E+04	2.3E+01	1.5E+01	9.1E+00				
Fonofos					4.1E+06	5.6E+02	1.8E+02	1.2E+02					1.3E+07	3.1E+03	2.0E+03	1.2E+03
Formaldehyde	1.9E+05			1.9E+05		4.2E+04	1.2E+04	9.2E+03	4.1E+05			4.1E+05		2.3E+05	1.5E+05	9.2E+04
Formic Acid					4.1E+09	5.6E+05	1.6E+05	1.2E+05					1.3E+10	3.1E+06	2.0E+06	1.2E+06
Fosetyl-al					6.2E+09	8.4E+05	2.3E+05	1.8E+05					2.0E+10	4.6E+06	3.1E+06	1.8E+06
Freon 113					2.1E+04		2.3E+06	2.1E+04					6.9E+04		3.1E+07	6.9E+04
Furan					2.6E+00		7.8E+01	2.5E+00					8.6E+00		1.0E+03	8.5E+00
Furazolidone	2.3E+03	5.3E-01	1.7E-01	1.3E-01					5.0E+03	1.1E+00	7.5E-01	4.5E-01				
Furfural					2.9E+07	8.4E+02	2.3E+02	1.8E+02					3.4E+06	4.6E+03	3.1E+03	1.8E+03
Furium	1.8E+02	4.0E-02	1.3E-02	9.7E-03					3.8E+02	8.7E-02	5.7E-02	3.4E-02				
Furmecyclox	2.9E+05	6.7E+01	2.1E+01	1.6E+01					6.3E+05	1.4E+02	9.5E+01	5.7E+01				
Glufosinate-ammonium					8.2E+05	1.1E+02	3.1E+01	2.4E+01					2.7E+06	6.2E+02	4.1E+02	2.5E+02
Glycidaldehyde					5.9E+05	1.1E+02	3.1E+01	2.4E+01					1.9E+06	6.2E+02	4.1E+02	2.5E+02
Glyphosate					2.1E+06	2.8E+04	7.8E+03	6.1E+03					6.7E+06	1.5E+05	1.0E+05	6.2E+04
Haloxyfop-methyl					1.0E+05	1.4E+01	3.9E+00	3.1E+00					3.4E+05	7.7E+01	5.1E+01	3.1E+01
Harmony					2.7E+07	3.6E+03	1.0E+03	7.9E+02					8.7E+07	2.0E+04	1.3E+04	8.0E+03
Heptachlor	1.9E+03	4.5E-01	1.4E-01	1.1E-01	1.0E+06	1.4E+02	3.9E+01	3.1E+01	4.1E+03	9.6E-01	6.4E-01	3.8E-01	3.4E+06	7.7E+02	5.1E+02	3.1E+02
Heptachlor epoxide	9.7E+02	2.2E-01	7.0E-02	5.3E-02	2.7E+04	3.6E+00	1.0E+00	7.9E-01	2.1E+03	4.8E-01	3.1E-01	1.9E-01	8.7E+04	2.0E+01	1.3E+01	8.0E+00
Hexabromobenzene					4.1E+06	5.6E+02	1.6E+02	1.2E+02					1.3E+07	3.1E+03	2.0E+03	1.2E+03
Hexachlorobenzene	5.5E+03	1.3E+00	4.0E-01	3.0E-01	1.6E+06	2.2E+02	6.3E+01	4.9E+01	1.2E+04	2.7E+00	1.8E+00	1.1E+00	5.4E+06	1.2E+03	8.2E+02	4.9E+02
Hexachlorobutadiene	1.1E+05	2.6E+01	8.2E+00	6.2E+00	6.2E+05	8.4E+01	2.3E+01	1.8E+01	2.4E+05	5.6E+01	3.7E+01	2.2E+01	2.0E+06	4.6E+02	3.1E+02	1.8E+02
HCH (alpha)	1.4E+03	8.0E-01	1.0E-01	9.0E-02	1.0E+06	3.5E+02	3.9E+01	3.5E+01	3.0E+03	1.7E+00	4.5E-01	3.6E-01	3.4E+06	1.9E+03	5.1E+02	4.0E+02
HCH (beta)	4.9E+03	2.8E+00	3.6E-01	3.2E-01	4.1E+05	1.4E+02	1.6E+01	1.4E+01	1.0E+04	6.0E+00	1.6E+00	1.3E+00	1.3E+06	7.7E+02	2.0E+02	1.6E+02
HCH (gamma) Lindane	6.8E+03	3.9E+00	4.9E-01	4.4E-01	6.2E+05	2.1E+02	2.3E+01	2.1E+01	1.4E+04	8.3E+00	2.2E+00	1.7E+00	2.0E+06	1.2E+03	3.1E+02	2.4E+02
HCH-technical	5.0E+03	2.8E+00	3.6E-01	3.2E-01					1.1E+04	6.0E+00	1.6E+00	1.3E+00				
Hexachlorocyclopentadiene					1.2E+05	1.7E+03	4.7E+02	3.7E+02					3.8E+05	9.3E+03	6.1E+03	3.7E+03
Hexachloroethane	6.3E+05	1.4E+02	4.6E+01	3.5E+01	2.1E+06	2.8E+02	7.8E+01	6.1E+01	1.3E+06	3.1E+02	2.0E+02	1.2E+02	6.7E+06	1.5E+03	1.0E+03	6.2E+02

CONTAMINANT	RESIDENTIAL SOIL								INDUSTRIAL SOIL							
	Cancer Risk = 1E-06				Chronic HQ = 1				Cancer Risk = 1E-06				Chronic HQ = 1			
	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)
Hexachlorophene					6.2E+05	8.4E+01	2.3E+01	1.8E+01					2.0E+06	4.6E+02	3.1E+02	1.8E+02
Hexahydro-1,3,5-trinitro-1,3,5-triazine	8.0E+04	1.8E+01	5.8E+00	4.4E+00	6.2E+06	8.4E+02	2.3E+02	1.8E+02	1.7E+05	3.9E+01	2.6E+01	1.8E+01	2.0E+07	4.6E+03	3.1E+03	1.8E+03
1,6-Hexamethylene diisocyanate					5.9E+03	8.0E-01	2.2E-01	1.7E-01					1.9E+04	4.4E+00	2.9E+00	1.8E+00
n-Hexane					1.2E+02		4.7E+03	1.2E+02					4.0E+02		6.1E+04	4.0E+02
Hexazinone					8.8E+07	9.2E+03	2.6E+03	2.0E+03					2.2E+08	5.1E+04	3.4E+04	2.0E+04
Hydrazine, hydrazine sulfate	5.2E+02	6.7E-01	2.1E-01	1.6E-01					1.1E+03	1.4E+00	9.5E-01	5.7E-01				
Hydrazine, monomethyl	5.2E+02	6.7E-01	2.1E-01	1.6E-01					1.1E+03	1.4E+00	9.5E-01	5.7E-01				
Hydrazine, dimethyl	5.2E+02	6.7E-01	2.1E-01	1.6E-01					1.1E+03	1.4E+00	9.5E-01	5.7E-01				
Hydrogen chloride					1.2E+07			1.1E+07					3.8E+07			3.6E+07
Hydrogen cyanide					1.1E+01		1.6E+03	1.1E+01					3.5E+01		2.0E+04	3.5E+01
Hydrogen sulfide							2.3E+02	2.3E+02							3.1E+03	3.1E+03
p-Hydroquinone					6.2E+07	1.1E+04	3.1E+03	2.4E+03					2.7E+08	6.2E+04	4.1E+04	2.5E+04
Imazalil					2.7E+07	3.6E+03	1.0E+03	7.9E+02					8.7E+07	2.0E+04	1.3E+04	8.0E+03
Imazaquin					5.1E+08	7.0E+04	2.0E+04	1.5E+04					1.7E+09	3.9E+05	2.6E+05	1.5E+05
Iprodione					8.2E+07	1.1E+04	3.1E+03	2.4E+03					2.7E+08	6.2E+04	4.1E+04	2.5E+04
Iron							2.3E+04	2.3E+04							3.1E+05	3.1E+05
Isobutanol					2.7E+04		2.3E+04	1.3E+04					8.8E+04		3.1E+05	6.8E+04
Isophorone	9.3E+06	2.1E+03	6.7E+02	5.1E+02	4.1E+08	5.6E+04	1.6E+04	1.2E+04	2.0E+07	4.6E+03	3.0E+03	1.8E+03	1.3E+09	3.1E+05	2.0E+05	1.2E+05
Isopropalin					3.1E+07	4.2E+03	1.2E+03	9.2E+02					1.0E+08	2.3E+04	1.5E+04	9.2E+03
Isopropyl methyl phosphonic acid					2.3E+08	2.8E+04	7.8E+03	6.1E+03					7.4E+08	1.5E+05	1.0E+05	6.2E+04
Isoxaben					1.0E+08	1.4E+04	3.9E+03	3.1E+03					3.4E+08	7.7E+04	5.1E+04	3.1E+04
Kepone	1.1E+03	2.5E-01	8.0E-02	6.1E-02	6.2E+05	8.4E+01	2.3E+01	1.8E+01	2.4E+03	5.4E-01	3.6E-01	2.2E-01	2.0E+06	4.6E+02	3.1E+02	1.8E+02
Lactofen					4.1E+06	5.6E+02	1.6E+02	1.2E+02					1.3E+07	3.1E+03	2.0E+03	1.2E+03
Lead++																
"CAL-Modified PRG"+++																
Lead (tetraethyl)						2.8E-02	7.8E-03	6.1E-03						1.5E-01	1.0E-01	6.2E-02
Linuron					4.1E+06	5.6E+02	1.6E+02	1.2E+02					1.3E+07	3.1E+03	2.0E+03	1.2E+03
Lithium							1.6E+03	1.6E+03							2.0E+04	2.0E+04
Londax					3.4E+09	5.6E+04	1.6E+04	1.2E+04					1.3E+09	3.1E+05	2.0E+05	1.2E+05
Malathion					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+08	3.1E+04	2.0E+04	1.2E+04
Maleic anhydride					2.1E+08	2.8E+04	7.8E+03	6.1E+03					6.7E+08	1.5E+05	1.0E+05	6.2E+04
Maleic hydrazide					1.7E+03		3.9E+04	1.7E+03					5.7E+03		5.1E+05	5.6E+03
Malononitrile					4.1E+04	5.6E+00	1.6E+00	1.2E+00					1.3E+05	3.1E+01	2.0E+01	1.2E+01
Mancozeb					6.2E+07	8.4E+03	2.3E+03	1.8E+03					2.0E+08	4.6E+04	3.1E+04	1.8E+04
Maneb	1.5E+05	3.4E+01	1.1E+01	8.1E+00	1.0E+07	1.4E+03	3.9E+02	3.1E+02	3.1E+05	7.2E+01	4.8E+01	2.9E+01	3.4E+07	7.7E+03	5.1E+03	3.1E+03
Manganese (non-food)+++					2.9E+04		1.9E+03	1.8E+03					9.4E+04		2.5E+04	1.9E+04
Mephosfolan					1.9E+05	2.5E+01	7.0E+00	5.5E+00					6.1E+05	1.4E+02	9.2E+01	5.5E+01
Mepiquat					6.2E+07	8.4E+03	2.3E+03	1.8E+03					2.0E+08	4.6E+04	3.1E+04	1.8E+04
2-Mercaptobenzothiazole	3.1E+05	7.0E+01	2.2E+01	1.7E+01	2.1E+08	2.8E+04	7.8E+03	6.1E+03	6.5E+05	1.5E+02	9.9E+01	5.9E+01	6.7E+08	1.5E+05	1.0E+05	6.2E+04
Mercury and compounds							2.3E+01	2.3E+01							3.1E+02	3.1E+02
Mercury (elemental)													5.8E+05			5.8E+05
Mercury (methyl)						2.8E+01	7.8E+00	6.1E+00						1.5E+02	1.0E+02	6.2E+01
Merphos					6.2E+04	8.4E+00	2.3E+00	1.8E+00					2.0E+05	4.6E+01	3.1E+01	1.8E+01
Merphos oxide					6.2E+04	8.4E+00	2.3E+00	1.8E+00					2.0E+05	4.6E+01	3.1E+01	1.8E+01
Metalaxyl					1.0E+09	1.7E+04	4.7E+03	3.7E+03					4.0E+08	9.3E+04	6.1E+04	3.7E+04
Methacrylonitrile					2.8E+00		7.8E+00	2.1E+00					9.1E+00		1.0E+02	6.4E+00
Methamidophos					1.0E+05	1.4E+01	3.9E+00	3.1E+00					3.4E+05	7.7E+01	5.1E+01	3.1E+01
Methanol					1.0E+09	1.4E+05	3.9E+04	3.1E+04					3.4E+09	7.7E+05	5.1E+05	3.1E+05
Methidathion					2.1E+06	2.8E+02	7.8E+01	6.1E+01					6.7E+06	1.5E+03	1.0E+03	6.2E+02
Methomyl					4.5E+01		2.0E+03	4.4E+01					1.5E+02		2.6E+04	1.5E+02
Methoxychlor					1.0E+07	1.4E+03	3.9E+02	3.1E+02					3.4E+07	7.7E+03	5.1E+03	3.1E+03

CONTAMINANT	RESIDENTIAL SOIL								INDUSTRIAL SOIL							
	Cancer Risk = 1E-06				Chronic HQ = 1				Cancer Risk = 1E-06				Chronic HQ = 1			
	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)
2-Methoxyethanol					1.2E+07	2.6E+02	7.8E+01	6.1E+01					3.6E+07	1.5E+03	1.0E+03	6.2E+02
2-Methoxyethanol acetate					4.1E+06	5.6E+02	1.6E+02	1.2E+02					1.3E+07	3.1E+03	2.0E+03	1.2E+03
2-Methoxy-5-nitroaniline	1.9E+05	4.4E+01	1.4E+01	1.1E+01					4.1E+05	9.4E+01	6.2E+01	3.7E+01				
Methyl acetate					3.1E+04		7.8E+04	2.2E+04					1.0E+05		1.0E+06	9.2E+04
Methyl acrylate					7.2E+01		2.3E+03	7.0E+01					2.3E+02		3.1E+04	2.3E+02
2-Methylaniline (o-toluidine)	3.7E+04	8.4E+00	2.7E+00	2.0E+00					7.8E+04	1.8E+01	1.2E+01	7.2E+00				
2-Methylaniline hydrochloride	4.9E+04	1.1E+01	3.6E+00	2.7E+00					1.0E+05	2.4E+01	1.6E+01	9.6E+00				
2-Methyl-4-chlorophenoxyacetic acid					1.0E+06	1.4E+02	3.9E+01	3.1E+01					3.4E+06	7.7E+02	5.1E+02	3.1E+02
4-(2-Methyl-4-chlorophenoxy) butyric acid (MCPB)					2.1E+07	2.8E+03	7.8E+02	6.1E+02					6.7E+07	1.5E+04	1.0E+04	6.2E+03
2-(2-Methyl-4-chlorophenoxy) propionic acid					2.1E+06	2.8E+02	7.8E+01	6.1E+01					6.7E+06	1.5E+03	1.0E+03	6.2E+02
2-(2-Methyl-1,4-chlorophenoxy) propionic acid (MCPP)					2.1E+06	2.8E+02	7.8E+01	6.1E+01					6.7E+06	1.5E+03	1.0E+03	6.2E+02
Methylcyclohexane					2.7E+03		6.7E+04	2.6E+03					8.8E+03		8.8E+05	6.7E+03
4,4'-Methylenebisbenzeneamine	3.5E+04	8.1E+00	2.6E+00	1.9E+00					7.5E+04	1.7E+01	1.1E+01	6.9E+00				
4,4'-Methylene bis(2-chloroaniline)	6.6E+04	1.6E+01	4.9E+00	3.7E+00	1.4E+06	2.0E+02	5.5E+01	4.3E+01	1.4E+05	3.3E+01	2.2E+01	1.3E+01	4.7E+06	1.1E+03	7.2E+02	4.3E+02
4,4'-Methylene bis(N,N'-dimethyl)aniline	1.9E+05	4.4E+01	1.4E+01	1.1E+01					4.1E+05	9.4E+01	6.2E+01	3.7E+01				
Methylene bromide					7.3E+01		7.8E+02	6.7E+01					2.4E+02		1.0E+04	2.3E+02
Methylene chloride	1.0E+01		6.5E+01	9.1E+00	3.3E+03		4.7E+03	2.0E+03	2.2E+01		3.6E+02	2.1E+01	1.1E+04		6.1E+04	9.3E+03
4,4'-Methylenediphenyl isocyanate					3.5E+05	4.7E+01	1.3E+01	1.0E+01					1.1E+06	2.6E+02	1.7E+02	1.0E+02
Methyl ethyl ketone					8.7E+03		4.7E+04	7.3E+03					2.8E+04		6.1E+05	2.7E+04
Methyl isobutyl ketone					9.0E+02		6.3E+03	7.9E+02					2.9E+03		8.2E+04	2.8E+03
Methyl mercaptan					1.2E+06	1.6E+02	4.5E+01	3.5E+01					3.8E+06	8.8E+02	5.8E+02	3.5E+02
Methyl methacrylate					2.2E+03		1.1E+05	2.2E+03					7.3E+03		1.4E+06	7.3E+03
2-Methyl-5-nitroaniline	2.7E+05	6.1E+01	1.9E+01	1.5E+01					5.7E+05	1.3E+02	8.7E+01	5.2E+01				
Methyl parathion					5.1E+05	7.0E+01	2.0E+01	1.5E+01					1.7E+06	3.9E+02	2.6E+02	1.5E+02
2-Methylphenol					1.0E+06	1.4E+04	3.9E+03	3.1E+03					3.4E+06	7.7E+04	5.1E+04	3.1E+04
3-Methylphenol					1.0E+06	1.4E+04	3.9E+03	3.1E+03					3.4E+06	7.7E+04	5.1E+04	3.1E+04
4-Methylphenol					1.0E+07	1.4E+03	3.9E+02	3.1E+02					3.4E+07	7.7E+03	5.1E+03	3.1E+03
Methyl phosphonic acid					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+06	3.1E+04	2.0E+04	1.2E+04
Methyl styrene (mixture)					1.8E+02		4.7E+02	1.3E+02					5.9E+02		6.1E+03	5.4E+02
Methyl styrene (alpha)					1.1E+03		5.5E+03	9.2E+02					3.6E+03		7.2E+04	3.4E+03
Methyl tertbutyl ether (MTBE)	9.0E+01		1.9E+02	6.2E+01	6.3E+03		6.7E+04	5.7E+03	1.8E+02		8.7E+02	1.6E+02	2.1E+04		8.8E+05	2.0E+04
"CAL-Modified PRG"	1.8E+01		3.6E+02	1.7E+01					3.7E+01		1.8E+03	3.6E+01				
Metolachor (Dual)					3.1E+06	4.2E+04	1.2E+04	9.2E+03					1.0E+09	2.3E+05	1.5E+05	9.2E+04
Metribuzin					5.1E+07	7.0E+03	2.0E+03	1.5E+03					1.7E+06	3.9E+04	2.6E+04	1.5E+04
Mirex	4.9E+03	1.1E+00	3.6E-01	2.7E-01	4.1E+05	5.6E+01	1.6E+01	1.2E+01	1.0E+04	2.4E+00	1.6E+00	9.6E-01	1.3E+06	3.1E+02	2.0E+02	1.2E+02
Molinate					4.1E+06	5.6E+02	1.6E+02	1.2E+02					1.3E+07	3.1E+03	2.0E+03	1.2E+03
Molybdenum							3.9E+02	3.9E+02							5.1E+03	5.1E+03
Monochloramine					2.1E+06	2.8E+04	7.8E+03	6.1E+03					6.7E+06	1.5E+05	1.0E+05	6.2E+04
Naled					4.1E+06	5.6E+02	1.6E+02	1.2E+02					1.3E+07	3.1E+03	2.0E+03	1.2E+03
Napropamide					2.1E+06	2.8E+04	7.8E+03	6.1E+03					6.7E+06	1.5E+05	1.0E+05	6.2E+04
Nickel and compounds							1.6E+03	1.6E+03							2.0E+04	2.0E+04
Nickel refinery dust	1.1E+04			1.1E+04					2.2E+04			2.2E+04				
Nickel subsulfide	5.2E+03			5.2E+03					1.1E+04			1.1E+04				
Nitrate+++																
Nitrite+++																
2-Nitroaniline					5.9E+04	8.0E+00	2.2E+00	1.7E+00					1.9E+05	4.4E+01	2.9E+01	1.8E+01
Nitrobenzene					3.9E+01		3.9E+01	2.0E+01					1.3E+02		5.1E+02	1.0E+02
Nitrofurantoin					1.4E+06	2.0E+04	5.5E+03	4.3E+03					4.7E+06	1.1E+05	7.2E+04	4.3E+04
Nitrofurazone	5.9E+03	1.3E+00	4.3E-01	3.2E-01					1.3E+04	2.9E+00	1.9E+00	1.1E+00				
Nitroglycerin	6.3E+05	1.4E+02	4.6E+01	3.5E+01					1.3E+06	3.1E+02	2.0E+02	1.2E+02				
Nitroguanidine					2.1E+06	2.8E+04	7.8E+03	6.1E+03					6.7E+06	1.5E+05	1.0E+05	6.2E+04

CONTAMINANT	RESIDENTIAL SOIL							INDUSTRIAL SOIL						
	Cancer Risk = 1E-06				Chronic HQ = 1			Cancer Risk = 1E-06				Chronic HQ = 1		
	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)
2-Nitropropane																
N-Nitrosodi-n-butylamine	3.1E-02		1.2E-01	2.4E-02					6.5E-02		5.3E-01	5.8E-02				
N-Nitrosodiethanolamine	3.2E+03	7.2E-01	2.3E-01	1.7E-01					6.7E+03	1.5E+00	1.0E+00	6.2E-01				
N-Nitrosodiethylamine	5.9E+01	1.3E-02	4.3E-03	3.2E-03					1.3E+02	2.9E-02	1.9E-02	1.1E-02				
N-Nitrosodimethylamine	1.8E+02	4.0E-02	1.3E-02	9.5E-03					3.8E+02	8.5E-02	5.6E-02	3.4E-02				
N-Nitrosodiphenylamine	1.8E+06	4.1E+02	1.3E+02	9.8E+01					3.8E+06	8.8E+02	5.8E+02	3.5E+02				
N-Nitroso di-n-propylamine	1.3E+03	2.9E-01	9.1E-02	6.9E-02					2.7E+03	6.2E-01	4.1E-01	2.5E-01				
N-Nitroso-N-methylethylamine	4.0E+02	9.2E-02	2.9E-02	2.2E-02					8.6E+02	2.0E-01	1.3E-01	7.8E-02				
N-Nitrosopyrrolidine	4.1E+03	9.6E-01	3.0E-01	2.3E-01					8.8E+03	2.1E+00	1.4E+00	8.2E-01				
m-Nitrotoluene					6.9E+02		7.8E+02	3.7E+02					2.3E+03		1.0E+04	1.8E+03
o-Nitrotoluene					6.9E+02		7.8E+02	3.7E+02					2.3E+03		1.0E+04	1.8E+03
p-Nitrotoluene					6.9E+02		7.8E+02	3.7E+02					2.3E+03		1.0E+04	1.8E+03
Norflurazon					8.2E+07	1.1E+04	3.1E+03	2.4E+03					2.7E+08	6.2E+04	4.1E+04	2.5E+04
NuStar					1.4E+06	2.0E+02	5.5E+01	4.3E+01					4.7E+06	1.1E+03	7.2E+02	4.3E+02
Octabromodiphenyl ether					6.2E+06	8.4E+02	2.3E+02	1.8E+02					2.0E+07	4.6E+03	3.1E+03	1.8E+03
Octahydro-1357-tetranitro-1357- tetrazocine (HMX)					1.0E+08	1.4E+04	3.9E+03	3.1E+03					3.4E+08	7.7E+04	5.1E+04	3.1E+04
Octamethylpyrophosphoramide					4.1E+06	5.6E+02	1.6E+02	1.2E+02					1.3E+07	3.1E+03	2.0E+03	1.2E+03
Oryzalin					1.0E+08	1.4E+04	3.9E+03	3.1E+03					3.4E+08	7.7E+04	5.1E+04	3.1E+04
Oxadiazon					1.0E+07	1.4E+03	3.9E+02	3.1E+02					3.4E+07	7.7E+03	5.1E+03	3.1E+03
Oxamyl					5.1E+07	7.0E+03	2.0E+03	1.5E+03					1.7E+08	3.9E+04	2.6E+04	1.5E+04
Oxyfluorfen					6.2E+06	8.4E+02	2.3E+02	1.8E+02					2.0E+07	4.6E+03	3.1E+03	1.8E+03
Paclobutrazol					2.7E+07	3.8E+03	1.0E+03	7.9E+02					8.7E+07	2.0E+04	1.3E+04	8.0E+03
Paraquat					9.3E+06	1.3E+03	3.5E+02	2.7E+02					3.0E+07	7.0E+03	4.6E+03	2.8E+03
Parathion					1.2E+07	1.7E+03	4.7E+02	3.7E+02					4.0E+07	9.3E+03	6.1E+03	3.7E+03
Pebulate					1.0E+08	1.4E+04	3.9E+03	3.1E+03					3.4E+08	7.7E+04	5.1E+04	3.1E+04
Pendimethalin					8.2E+07	1.1E+04	3.1E+03	2.4E+03					2.7E+08	6.2E+04	4.1E+04	2.5E+04
Pentabromo-6-chloro cyclohexane	3.8E+05	8.8E+01	2.8E+01	2.1E+01					8.2E+05	1.9E+02	1.2E+02	7.5E+01				
Pentabromodiphenyl ether					4.1E+06	5.6E+02	1.6E+02	1.2E+02					1.3E+07	3.1E+03	2.0E+03	1.2E+03
Pentachlorobenzene					1.6E+06	2.2E+02	6.3E+01	4.9E+01					5.4E+06	1.2E+03	8.2E+02	4.9E+02
Pentachloronitrobenzene	3.4E+04	7.8E+00	2.5E+00	1.9E+00	6.2E+06	8.4E+02	2.3E+02	1.8E+02	7.2E+04	1.7E+01	1.1E+01	6.6E+00	2.0E+07	4.6E+03	3.1E+03	1.8E+03
Pentachlorophenol	7.4E+04	6.7E+00	5.3E+00	3.0E+00	6.2E+07	3.4E+03	2.3E+03	1.4E+03	1.6E+05	1.4E+01	2.4E+01	9.0E+00	2.0E+08	1.9E+04	3.1E+04	1.2E+04
Perchlorate							7.6E+00	7.6E+00							1.0E+02	1.0E+02
Permethrin					1.0E+06	1.4E+04	3.9E+03	3.1E+03					3.4E+06	7.7E+04	5.1E+04	3.1E+04
Phenmedipham					5.1E+06	7.0E+04	2.0E+04	1.5E+04					1.7E+09	3.9E+05	2.6E+05	1.5E+05
Phenol					1.2E+09	1.7E+05	4.7E+04	3.7E+04					4.0E+09	9.3E+05	6.1E+05	3.7E+05
Phenothiazine					4.1E+06	5.6E+02	1.6E+02	1.2E+02					1.3E+07	3.1E+03	2.0E+03	1.2E+03
m-Phenylenediamine					1.2E+07	1.7E+03	4.7E+02	3.7E+02					4.0E+07	9.3E+03	6.1E+03	3.7E+03
p-Phenylenediamine					3.9E+06	5.3E+04	1.5E+04	1.2E+04					1.3E+09	2.9E+05	1.9E+05	1.2E+05
Phenylmercuric acetate					1.6E+05	2.2E+01	6.3E+00	4.9E+00					5.4E+05	1.2E+02	8.2E+01	4.9E+01
2-Phenylphenol	4.7E+06	1.0E+03	3.3E+02	2.5E+02					9.9E+06	2.2E+03	1.5E+03	8.9E+02				
Phorate					4.1E+05	5.6E+01	1.6E+01	1.2E+01					1.3E+06	3.1E+02	2.0E+02	1.2E+02
Phosmet					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+08	3.1E+04	2.0E+04	1.2E+04
Phosphine					1.6E+05	8.4E+01	2.3E+01	1.6E+01					5.6E+05	4.6E+02	3.1E+02	1.8E+02
Phosphoric acid																
Phosphorus (white)							1.6E+00	1.6E+00							2.0E+01	2.0E+01
p-Phthalic acid					2.1E+09	2.8E+05	7.6E+04	6.1E+04					6.7E+09	1.5E+06	1.0E+06	6.2E+05
Phthalic anhydride					7.0E+07	5.6E+05	1.6E+05	1.2E+05					2.3E+08	3.1E+06	2.0E+06	1.2E+06
Picloram					1.4E+06	2.0E+04	5.5E+03	4.3E+03					4.7E+08	1.1E+05	7.2E+04	4.3E+04
Pirimiphos-methyl					2.1E+07	2.6E+03	7.6E+02	6.1E+02					6.7E+07	1.5E+04	1.0E+04	6.2E+03
Polybrominated biphenyls	9.9E+02	2.3E-01	7.2E-02	5.5E-02	1.4E+04	2.0E+00	5.5E-01	4.3E-01	2.1E+03	4.9E-01	3.2E-01	1.9E-01	4.7E+04	1.1E+01	7.2E+00	4.3E+00
Polychlorinated biphenyls (PCBs)	4.4E+03	7.2E-01	3.2E-01	2.2E-01					9.4E+03	1.5E+00	1.4E+00	7.4E-01				

CONTAMINANT	RESIDENTIAL SOIL								INDUSTRIAL SOIL							
	Cancer Risk = 1E-06				Chronic HQ = 1				Cancer Risk = 1E-06				Chronic HQ = 1			
	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)
Aroclor 1016	1.3E+05	2.1E+01	9.1E+00	6.3E+00	1.4E+05	1.4E+01	5.5E+00	3.9E+00	2.7E+05	4.4E+01	4.1E+01	2.1E+01	4.7E+05	7.7E+01	7.2E+01	3.7E+01
Aroclor 1221	4.4E+03	7.2E-01	3.2E-01	2.2E-01					9.4E+03	1.5E+00	1.4E+00	7.4E-01				
Aroclor 1232	4.4E+03	7.2E-01	3.2E-01	2.2E-01					9.4E+03	1.5E+00	1.4E+00	7.4E-01				
Aroclor 1242	4.4E+03	7.2E-01	3.2E-01	2.2E-01					9.4E+03	1.5E+00	1.4E+00	7.4E-01				
Aroclor 1248	4.4E+03	7.2E-01	3.2E-01	2.2E-01					9.4E+03	1.5E+00	1.4E+00	7.4E-01				
Aroclor 1254	4.4E+03	7.2E-01	3.2E-01	2.2E-01	4.1E+04	4.0E+00	1.6E+00	1.1E+00	9.4E+03	1.5E+00	1.4E+00	7.4E-01	1.3E+05	2.2E+01	2.0E+01	1.1E+01
Aroclor 1260	4.4E+03	7.2E-01	3.2E-01	2.2E-01					9.4E+03	1.5E+00	1.4E+00	7.4E-01				
Polychlorinated terphenyls	2.0E+03	4.5E-01	1.4E-01	1.1E-01					4.2E+03	9.6E-01	6.4E-01	3.8E-01				
Polynuclear aromatic hydrocarbons																
Acenaphthene					1.7E+04		4.7E+03	3.7E+03					5.6E+04		6.1E+04	2.9E+04
Anthracene					3.3E+05		2.3E+04	2.2E+04					1.1E+06		3.1E+05	2.4E+05
Benz[a]anthracene	1.2E+04	2.1E+00	8.8E-01	6.2E-01					2.6E+04	4.6E+00	3.9E+00	2.1E+00				
Benzo[b]fluoranthene	1.2E+04	2.1E+00	8.8E-01	6.2E-01					2.6E+04	4.6E+00	3.9E+00	2.1E+00				
Benzo[k]fluoranthene	1.2E+05	2.1E+01	8.8E+00	6.2E+00					2.6E+05	4.6E+01	3.9E+01	2.1E+01				
"CAL-Modified PRG"	2.9E+04	1.3E+00	5.3E-01	3.8E-01					4.8E+04	2.8E+00	2.4E+00	1.3E+00				
Benzo[a]pyrene	1.2E+03	2.1E-01	8.8E-02	6.2E-02					2.6E+03	4.6E-01	3.9E-01	2.1E-01				
Chrysene	1.2E+06	2.1E+02	8.8E+01	6.2E+01					2.6E+06	4.6E+02	3.9E+02	2.1E+02				
"CAL-Modified PRG"	2.3E+05	1.3E+01	5.3E+00	3.8E+00					4.8E+05	2.8E+01	2.4E+01	1.3E+01				
Dibenz[ah]anthracene	1.2E+03	2.1E-01	8.8E-02	6.2E-02					2.6E+03	4.6E-01	3.9E-01	2.1E-01				
Fluoranthene					8.2E+07	8.6E+03	3.1E+03	2.3E+03					2.7E+06	4.6E+04	4.1E+04	2.2E+04
Fluorene					2.3E+04		3.1E+03	2.7E+03					7.4E+04		4.1E+04	2.6E+04
Indeno[1,2,3-cd]pyrene	1.2E+04	2.1E+00	8.8E-01	6.2E-01					2.6E+04	4.6E+00	3.9E+00	2.1E+00				
Naphthalene					5.6E+01		1.6E+03	5.6E+01					1.9E+02		2.0E+04	1.9E+02
Pyrene					1.8E+05		2.3E+03	2.3E+03					5.8E+05		3.1E+04	2.9E+04
Prochloraz	5.9E+04	1.3E+01	4.3E+00	3.2E+00	1.9E+07	2.5E+03	7.0E+02	5.5E+02	1.3E+05	2.9E+01	1.9E+01	1.1E+01	6.1E+07	1.4E+04	9.2E+03	5.5E+03
Profluralin					1.2E+07	1.7E+03	4.7E+02	3.7E+02					4.0E+07	9.3E+03	6.1E+03	3.7E+03
Prometon					3.1E+07	4.2E+03	1.2E+03	9.2E+02					1.0E+08	2.3E+04	1.5E+04	9.2E+03
Prometryn					8.2E+06	1.1E+03	3.1E+02	2.4E+02					2.7E+07	6.2E+03	4.1E+03	2.5E+03
Pronamide					1.5E+08	2.1E+04	5.9E+03	4.6E+03					5.0E+08	1.2E+05	7.7E+04	4.6E+04
Propachlor					2.7E+07	3.6E+03	1.0E+03	7.9E+02					8.7E+07	2.0E+04	1.3E+04	8.0E+03
Propanil					1.0E+07	1.4E+03	3.9E+02	3.1E+02					3.4E+07	7.7E+03	5.1E+03	3.1E+03
Propargite					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+08	3.1E+04	2.0E+04	1.2E+04
Propargyl alcohol					4.1E+06	5.6E+02	1.6E+02	1.2E+02					1.3E+07	3.1E+03	2.0E+03	1.2E+03
Propazine					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+08	3.1E+04	2.0E+04	1.2E+04
Propham					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+08	3.1E+04	2.0E+04	1.2E+04
Propiconazole					2.7E+07	3.6E+03	1.0E+03	7.9E+02					8.7E+07	2.0E+04	1.3E+04	8.0E+03
n-Propylbenzene					7.1E+02		3.1E+03	5.8E+02					2.3E+03		4.1E+04	2.2E+03
Propylene glycol					1.8E+06	1.4E+05	3.9E+04	3.0E+04					5.8E+06	7.7E+05	5.1E+05	2.9E+05
Propylene glycol, monoethyl ether					1.4E+09	2.0E+05	5.5E+04	4.3E+04					4.7E+09	1.1E+06	7.2E+05	4.3E+05
Propylene glycol, monomethyl ether					1.2E+09	2.0E+05	5.5E+04	4.3E+04					3.8E+09	1.1E+06	7.2E+05	4.3E+05
Propylene oxide	7.0E+00		2.7E+00	1.9E+00	1.8E+02		6.7E+02	1.4E+02	1.5E+01		1.2E+01	6.6E+00	5.9E+02		8.8E+03	5.5E+02
Pursuit					5.1E+08	7.0E+04	2.0E+04	1.5E+04					1.7E+09	3.9E+05	2.6E+05	1.5E+05
Pydrin					5.1E+07	7.0E+03	2.0E+03	1.5E+03					1.7E+08	3.9E+04	2.6E+04	1.5E+04
Pyridine					2.1E+06	2.8E+02	7.8E+01	6.1E+01					6.7E+06	1.5E+03	1.0E+03	6.2E+02
Quinalphos					1.0E+08	1.4E+02	3.9E+01	3.1E+01					3.4E+08	7.7E+02	5.1E+02	3.1E+02
Quinoline	2.9E+03	6.7E-01	2.1E-01	1.6E-01					6.3E+03	1.4E+00	9.5E-01	5.7E-01				
RDX (Cyclonite)	8.0E+04	1.8E+01	5.8E+00	4.4E+00	6.2E+06	8.4E+02	2.3E+02	1.8E+02	1.7E+05	3.9E+01	2.6E+01	1.6E+01	2.0E+07	4.6E+03	3.1E+03	1.8E+03
Resmethrin					6.2E+07	8.4E+03	2.3E+03	1.8E+03					2.0E+08	4.6E+04	3.1E+04	1.8E+04
Ronnel					1.0E+08	1.4E+04	3.9E+03	3.1E+03					3.4E+08	7.7E+04	5.1E+04	3.1E+04
Rotenone					6.2E+06	1.1E+03	3.1E+02	2.4E+02					2.7E+07	6.2E+03	4.1E+03	2.5E+03

CONTAMINANT	RESIDENTIAL SOIL								INDUSTRIAL SOIL							
	Cancer Risk = 1E-06				Chronic HQ = 1				Cancer Risk = 1E-06				Chronic HQ = 1			
	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)
Savey					5.1E+07	7.0E+03	2.0E+03	1.5E+03					1.7E+06	3.9E+04	2.6E+04	1.5E+04
Selenious Acid						1.4E+03	3.9E+02	3.1E+02						7.7E+03	5.1E+03	3.1E+03
Selenium							3.9E+02	3.9E+02							5.1E+03	5.1E+03
Selenourea						1.4E+03	3.9E+02	3.1E+02						7.7E+03	5.1E+03	3.1E+03
Sethoxydim					1.9E+06	2.5E+04	7.0E+03	5.5E+03					6.1E+06	1.4E+05	9.2E+04	5.5E+04
Silver and compounds							3.9E+02	3.9E+02							5.1E+03	5.1E+03
Simazine	7.4E+04	1.7E+01	5.3E+00	4.1E+00	4.1E+06	1.4E+03	3.9E+02	3.1E+02	1.6E+05	3.6E+01	2.4E+01	1.4E+01	1.3E+07	7.7E+03	5.1E+03	3.1E+03
Sodium azide																
Sodium diethyldithiocarbamate	3.3E+04	7.5E+00	2.4E+00	1.8E+00	6.2E+07	8.4E+03	2.3E+03	1.8E+03	7.0E+04	1.6E+01	1.1E+01	6.4E+00	2.0E+06	4.6E+04	3.1E+04	1.8E+04
Sodium fluoroacetate					4.1E+04	5.6E+00	1.8E+00	1.2E+00					1.3E+05	3.1E+01	2.0E+01	1.2E+01
Sodium metavanadate					2.1E+06	2.8E+02	7.6E+01	6.1E+01					6.7E+06	1.5E+03	1.0E+03	6.2E+02
Strontium, stable							4.7E+04	4.7E+04							6.1E+05	6.1E+05
Strychnine					6.2E+05	8.4E+01	2.3E+01	1.8E+01					2.0E+06	4.6E+02	3.1E+02	1.8E+02
Styrene					6.1E+03		1.6E+04	4.4E+03					2.0E+04		2.0E+05	1.8E+04
1,1'-Sulfonylbis (4-chlorobenzene)					2.1E+06		7.6E+01	7.6E+01					6.7E+06		1.0E+03	1.0E+03
Systhane					5.1E+07	7.0E+03	2.0E+03	1.5E+03					1.7E+06	3.9E+04	2.6E+04	1.5E+04
2,3,7,8-TCDD (dioxin)	5.9E-02	4.5E-05	4.3E-05	3.9E-05					1.3E-01	9.6E-05	1.9E-05	1.6E-05				
Tebuthiuron					1.4E+06	2.0E+04	5.5E+03	4.3E+03					4.7E+06	1.1E+05	7.2E+04	4.3E+04
Temephos					4.1E+07	5.6E+03	1.6E+03	1.2E+03					1.3E+06	3.1E+04	2.0E+04	1.2E+04
Terbacil					2.7E+07	3.6E+03	1.0E+03	7.9E+02					8.7E+07	2.0E+04	1.3E+04	8.0E+03
Terbufos					5.1E+04	7.0E+00	2.0E+00	1.5E+00					1.7E+05	3.9E+01	2.6E+01	1.5E+01
Terbutryn					2.1E+06	2.8E+02	7.8E+01	6.1E+01					6.7E+06	1.5E+03	1.0E+03	6.2E+02
1,2,4,5-Tetrachlorobenzene					6.2E+05	8.4E+01	2.3E+01	1.8E+01					2.0E+06	4.6E+02	3.1E+02	1.8E+02
1,1,1,2-Tetrachloroethane	3.7E+00		2.5E+01	3.2E+00	6.6E+02		2.3E+03	5.2E+02	7.8E+00		1.1E+02	7.3E+00	2.2E+03		3.1E+04	2.0E+03
1,1,2,2-Tetrachloroethane	4.7E-01		3.2E+00	4.1E-01	1.3E+03		4.7E+03	1.0E+03	9.9E-01		1.4E+01	9.3E-01	4.3E+03		6.1E+04	4.0E+03
Tetrachloroethylene (PCE)	1.7E+00		1.2E+01	1.5E+00	6.8E+02		7.8E+02	3.6E+02	3.6E+00		5.5E+01	3.4E+00	2.2E+03		1.0E+04	1.6E+03
2,3,4,6-Tetrachlorophenol					6.2E+07	8.4E+03	2.3E+03	1.8E+03					2.0E+06	4.6E+04	3.1E+04	1.8E+04
p,a,a,a-Tetrachlorotoluene	4.4E+02	1.0E-01	3.2E-02	2.4E-02					9.4E+02	2.2E-01	1.4E-01	8.6E-02				
Tetrachlorovinphos	3.7E+05	8.4E+01	2.7E+01	2.0E+01	6.2E+07	8.4E+03	2.3E+03	1.8E+03	7.8E+05	1.8E+02	1.2E+02	7.2E+01	2.0E+06	4.6E+04	3.1E+04	1.8E+04
Tetraethyldithiopyrophosphate					1.0E+06	1.4E+02	3.9E+01	3.1E+01					3.4E+06	7.7E+02	5.1E+02	3.1E+02
Tetrahydrofuran	1.1E+01		8.4E+01	9.4E+00	1.4E+03		1.6E+04	1.3E+03	2.2E+01		3.8E+02	2.1E+01	4.7E+03		2.1E+05	4.6E+03
Thallium and compounds+++							5.2E+00	5.2E+00							6.7E+01	6.7E+01
Thiobencarb					2.1E+07	2.6E+03	7.8E+02	6.1E+02					6.7E+07	1.5E+04	1.0E+04	6.2E+03
Thiocyanate					1.0E+06	1.4E+04	3.9E+03	3.1E+03					3.4E+06	7.7E+04	5.1E+04	3.1E+04
Thiofanox					6.2E+05	8.4E+01	2.3E+01	1.8E+01					2.0E+06	4.6E+02	3.1E+02	1.8E+02
Thiophanate-methyl					1.6E+06	2.2E+04	6.3E+03	4.9E+03					5.4E+06	1.2E+05	8.2E+04	4.9E+04
Thiram					1.0E+07	1.4E+03	3.9E+02	3.1E+02					3.4E+07	7.7E+03	5.1E+03	3.1E+03
Tin and compounds							4.7E+04	4.7E+04							6.1E+05	6.1E+05
Toluene					6.8E+02		1.6E+04	6.6E+02					2.2E+03		2.0E+05	2.2E+03
Toluene-2,4-diamine	2.8E+03	6.3E-01	2.0E-01	1.5E-01					5.9E+03	1.4E+00	8.9E-01	5.4E-01				
Toluene-2,5-diamine					1.2E+09	1.7E+05	4.7E+04	3.7E+04					4.0E+09	9.3E+05	6.1E+05	3.7E+05
Toluene-2,6-diamine					4.1E+06	5.6E+04	1.6E+04	1.2E+04					1.3E+09	3.1E+05	2.0E+05	1.2E+05
p-Toluidine	4.7E+04	1.1E+01	3.4E+00	2.6E+00					9.9E+04	2.3E+01	1.5E+01	9.1E+00				
Toxaphene	7.8E+03	1.8E+00	5.8E-01	4.4E-01					1.7E+04	3.9E+00	2.6E+00	1.5E+00				
Tralomethrin					1.5E+07	2.1E+03	5.9E+02	4.6E+02					5.0E+07	1.2E+04	7.7E+03	4.6E+03
Triallate					2.7E+07	3.6E+03	1.0E+03	7.9E+02					8.7E+07	2.0E+04	1.3E+04	8.0E+03
Triasulfuron					2.1E+07	2.8E+03	7.8E+02	6.1E+02					6.7E+07	1.5E+04	1.0E+04	6.2E+03
1,2,4-Tribromobenzene					1.0E+07	1.4E+03	3.9E+02	3.1E+02					3.4E+07	7.7E+03	5.1E+03	3.1E+03
Tributyltin oxide (TBTO)						8.4E+01	2.3E+01	1.8E+01						4.6E+02	3.1E+02	1.8E+02
2,4,6-Trichloroaniline	2.6E+05	6.0E+01	1.9E+01	1.4E+01					5.5E+05	1.3E+02	8.4E+01	5.1E+01				
2,4,6-Trichloroaniline hydrochloride	3.1E+05	7.0E+01	2.2E+01	1.7E+01					6.5E+05	1.5E+02	9.9E+01	5.9E+01				

CONTAMINANT	RESIDENTIAL SOIL							INDUSTRIAL SOIL						
	Cancer Risk = 1E-06				Chronic HQ = 1			Cancer Risk = 1E-06				Chronic HQ = 1		
	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)	soil-inhale (mg/kg)	soil-dermal (mg/kg)	soil-ingest (mg/kg)	combined (mg/kg)
1,2,4-Trichlorobenzene					3.8E+03		7.8E+02	6.5E+02					1.3E+04		1.0E+04	5.6E+03
1,1,1-Trichloroethane					2.2E+03		2.2E+04	2.0E+03					7.1E+03		2.9E+05	6.9E+03
1,1,2-Trichloroethane	7.8E-01		1.1E+01	7.3E-01	4.1E+01		3.1E+02	3.8E+01	1.7E+00		5.0E+01	1.6E+00	1.3E+02		4.1E+03	1.3E+02
Trichloroethylene (TCE)	5.5E-02		1.6E+00	5.3E-02	5.1E+01		2.3E+01	1.6E+01	1.2E-01		7.2E+00	1.1E-01	1.7E+02		3.1E+02	1.1E+02
Trichlorofluoromethane					3.9E+02		2.3E+04	3.9E+02					1.3E+03		3.1E+05	1.3E+03
2,4,5-Trichlorophenol					2.1E+06	2.8E+04	7.8E+03	6.1E+03					6.7E+06	1.5E+05	1.0E+05	6.2E+04
2,4,6-Trichlorophenol	8.2E+05	1.8E+02	5.8E+01	4.4E+01	2.1E+05	2.8E+01	7.8E+00	6.1E+00	1.7E+06	3.9E+02	2.6E+02	1.6E+02	6.7E+05	1.5E+02	1.0E+02	6.2E+01
"CAL-Modified PRG"	1.3E+05	2.9E+01	9.1E+00	6.9E+00					2.7E+05	6.2E+01	4.1E+01	2.5E+01				
2,4,5-Trichlorophenoxyacetic Acid					2.1E+07	2.8E+03	7.8E+02	6.1E+02					6.7E+07	1.5E+04	1.0E+04	6.2E+03
2-(2,4,5-Trichlorophenoxy) propionic acid					1.6E+07	2.2E+03	6.3E+02	4.9E+02					5.4E+07	1.2E+04	8.2E+03	4.9E+03
1,1,2-Trichloropropane					1.6E+01		3.9E+02	1.5E+01					5.1E+01		5.1E+03	5.1E+01
1,2,3-Trichloropropane	5.1E-03		3.2E-01	5.0E-03	3.3E+00		4.7E+02	3.3E+00	1.1E-02		1.4E+00	1.1E-02	1.1E+01		6.1E+03	1.1E+01
1,2,3-Trichloropropene					1.2E+01		3.9E+02	1.2E+01					3.9E+01		5.1E+03	3.8E+01
Tridiphane					6.2E+06	8.4E+02	2.3E+02	1.8E+02					2.0E+07	4.6E+03	3.1E+03	1.8E+03
Triethylamine					2.8E+01		1.6E+02	2.3E+01					9.0E+01		2.0E+03	8.6E+01
Trifluralin	1.1E+06	2.6E+02	8.3E+01	6.3E+01	1.5E+07	2.1E+03	5.9E+02	4.6E+02	2.4E+06	5.6E+02	3.7E+02	2.2E+02	5.0E+07	1.2E+04	7.7E+03	4.6E+03
Trimellitic Anhydride (TMAN)					2.9E+05	3.9E+01	1.1E+01	8.6E+00					9.4E+05	2.2E+02	1.4E+02	8.6E+01
1,2,4-Trimethylbenzene					5.2E+01		3.9E+03	5.2E+01					1.7E+02		5.1E+04	1.7E+02
1,3,5-Trimethylbenzene					2.1E+01		3.9E+03	2.1E+01					7.0E+01		5.1E+04	7.0E+01
Trimethyl phosphate	2.4E+05	5.5E+01	1.7E+01	1.3E+01					5.1E+05	1.2E+02	7.7E+01	4.7E+01				
1,3,5-Trinitrobenzene					6.2E+07	8.4E+03	2.3E+03	1.8E+03					2.0E+08	4.6E+04	3.1E+04	1.8E+04
Trinitrophenylmethylnitramine					2.1E+07	2.8E+03	7.8E+02	6.1E+02					6.7E+07	1.5E+04	1.0E+04	6.2E+03
2,4,6-Trinitrotoluene	2.9E+05	6.7E+01	2.1E+01	1.6E+01	1.0E+06	1.4E+02	3.9E+01	3.1E+01	6.3E+05	1.4E+02	9.5E+01	5.7E+01	3.4E+06	7.7E+02	5.1E+02	3.1E+02
Triphenylphosphine oxide					1.0E+07	1.4E+03	3.9E+02	3.1E+02					3.4E+07	7.7E+03	5.1E+03	3.1E+03
Tris(2-chloroethyl) phosphate	2.8E+06	6.3E+02	2.0E+02	1.5E+02	2.3E+06	3.1E+04	8.6E+03	6.7E+03	5.9E+06	1.4E+03	8.9E+02	5.4E+02	7.4E+06	1.7E+05	1.1E+05	6.8E+04
Uranium (chemical toxicity only)	SEE RAD GUIDANCE						1.6E+01	1.6E+01	SEE RAD GUIDANCE						2.0E+02	2.0E+02
Vanadium and compounds							5.5E+02	5.5E+02							7.2E+03	7.2E+03
Vernam					2.1E+06	2.8E+02	7.8E+01	6.1E+01					6.7E+06	1.5E+03	1.0E+03	6.2E+02
Vinclozolin					5.1E+07	7.0E+03	2.0E+03	1.5E+03					1.7E+08	3.9E+04	2.6E+04	1.5E+04
Vinyl acetate					4.3E+02		7.8E+04	4.3E+02					1.4E+03		1.0E+06	1.4E+03
Vinyl bromide	2.0E-01		5.8E+00	1.9E-01	4.4E+00		6.7E+01	4.1E+00	4.3E-01		2.6E+01	4.2E-01	1.4E+01		8.8E+02	1.4E+01
Vinyl chloride (child/adult)+++	1.1E-01		2.8E-01	7.9E-02	4.6E+01		2.3E+02	3.9E+01								
Vinyl chloride (adult)									9.3E-01		3.6E+00	7.5E-01	1.5E+02		3.1E+03	1.4E+02
Warfarin					6.2E+05	8.4E+01	2.3E+01	1.8E+01					2.0E+06	4.6E+02	3.1E+02	1.8E+02
Xylenes					2.8E+02	2.0E+05	5.5E+04	2.7E+02					9.0E+02	1.1E+06	7.2E+05	9.0E+02
Zinc							2.3E+04	2.3E+04							3.1E+05	3.1E+05
Zinc phosphide							2.3E+01	2.3E+01							3.1E+02	3.1E+02
Zineb					1.0E+06	1.4E+04	3.9E+03	3.1E+03					3.4E+06	7.7E+04	5.1E+04	3.1E+04

Appendix C

Additional Modeling Documentation

Acronyms and Abbreviations

C_a	concentration of contaminant in air
C_{amax}	maximum concentration of contaminant in air
C_w	water concentration
C_{wav}	average contaminant concentration in water
C_{wi}	initial contaminant concentration in water
CT	central tendency
Da	diffusion coefficient in air
Dw	diffusion coefficient in water
ED	exposure duration
f	fraction of contaminant volatilized
f_i	volatilization fraction for chemical i
f_j	volatilization fraction for chemical j
F_w	water flow rate
H	Henry's law constant
HEAST	Health Effects Assessment Summary Tables
HI	hazard index
IRIS	Integrated Risk Information System
NA	not applicable
NJDEP	New Jersey Department of Environmental Protection
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
R	Gas constant
RfC	reference concentration
Risk	cancer risk
RME	reasonable maximum exposure
T	temperature
t1	time of showering
t2	time after showering
UR	unit risk
U.S. EPA	U. S. Environmental Protection Agency
V_a	bathroom volume
X	exponential variable

Table C-1. Algorithms for Andelman model (Revised by Schaum et al.[1994])

Exposure During Showering

Variable	Definition	Unit
Chemical selection criteria for this pathway:		
a.	Henry's law constant greater than or equal to 1E-5 atm-m3/mol; or	
b.	Chemicals that have a molecular weight less than 200	
(1). Volatized chemical concentration in air		
$C_a = [(C_{aMax}/2)t_1 + C_{aMax}t_2] / (t_1 + t_2)$		
$C_{aMax} = C_w \times f \times F_w \times t_1 / V_a$		
Where:		
C_a = concentration of contaminant in air		mg/m^3
C_{amax} = maximum concentration of contaminant in air		mg/m^3
t_1 = time of showering		hr
t_2 = time after showering		hr
Cw = water concentration		mg/L
f = fraction of contaminant volatilized		unitless
F_w = water flow rate		L/hr
V_a = bathroom volume		m^3
(2). Volatilization fraction for untested chemicals		
$f_i = f_j \times [2.5/Dw^{0.67} + RT/(Da^{0.67}H)]_i / [2.5/Dw^{0.67} + RT/(Da^{0.67}H)]_j$		
Where:		
f_i = volatilization fraction for chemical i		unitless
f_j = volatilization fraction for chemical j		unitless
Da = diffusion coefficient in air		m^2/s
Dw = diffusion coefficient in water		m^2/s
R = gas constant		$atm\text{-}m^3/mol\text{-}K$
H = Henry's law constant		$atm\text{-}m^3/mol$
T = temperature		K
(3). Risk characterization		
Cancer Risk = $1 - e^{-X}$		
$X = UR \times C_a \times [(t_1 + t_2)/24\ hr] \times [ED/70\ years]$		
Hazard Index = $[C_a/RfC] \times [(t_1 + t_2)/24\ hr]$		
Where:		
C_a = concentration of contaminant in air		mg/m^3
UR = unit risk		m^3/mg
RfC = reference concentration		mg/m^3
t_1 = time of showering		hr
t_2 = time after showering		hr
ED = exposure duration		year
X = exponential variable		unitless
Risk = cancer risk		
HI = hazard Index		

Source: Schaum et al. 1994. Exposure to volatiles in domestic water. pp. 305–321. In: Water Contamination and Health: Integration of Exposure Assessment, Toxicology, and Risk Assessment. R.G.M. Wang (ed). Marcel Dekker, Inc., New York, NY.

Table C-2. Summary of Input parameters for Andelman model[a]

Exposure Scenario: Reasonable Maximum Exposure and Central Tendency for Adult

Parameter Definition	Variable	Unit	RME Value	CT Value	Selection Basis	Comment
Groundwater concentration	C_w	mg/L	Site-specific	Site-specific	S	Based on site-specific sampling results and is the lower of either the maximum or the upper 95th percentile confidence limit on the mean.
Time of showering	t_1	hr	0.25	0.1	SL	Values were recommended by U.S. EPA Region 2.
Time after showering	t_2	hr	0.33	0.15	SL	Values were recommended by U.S. EPA Region 2.
Fraction of contaminant that is volatilized	f	unitless	0.9	0.5	D	Selected from the recommended range of 0.5–0.9 by Schaum et al. (1994).
Water flow rate into the shower	F_w	L/hr	1,000	500	D	Default range for this parameter is 500–1,000 L/hr by Schaum et al. (1994).
Bathroom volume	V_a	m^3	6	16	SL	Selected from the recommended range of 6–16 by Schaum et al. (1994).
Unit risk	UR	m^3/mg	Chemical-specific	Chemical-specific	D	The most updated value from IRIS, HEAST, or other sources will be used.
Reference concentration	RfC	mg/m^3	Chemical-specific	Chemical-specific	D	The most updated value from IRIS, HEAST, or other sources will be used.
Initial contaminant concentration in water	C_{wi}	mg/L	Chemical-specific	Chemical-specific	S	Based on site-specific sampling results and statistical analysis.
Average contaminant concentration in water	C_{wav}	mg/cm^3	Calculated	Calculated		Value will be calculated using C_{wi} and methodology by Schaum et al. (1994).
Exposure frequency	EF	days/year	350	350	D	
Exposure duration	ED	year	30	9	D	Default range for this parameter is 9–30 years by Schaum et al. (1994).
Body weight	BW	kg	70	70	D	
Average time	AT	days	10,500 (non-cancer)	3,150 (non-cancer)	D	
			25,550 (cancer)	25,550 (cancer)	D	

Note: D - default
S - site- or chemical-specific
SL - selected from within the recommended range of parameter values

[a] As requested by NJDEP, the Andelman model (as modified by Schaum et al. 1994) will be used to estimate exposure to volatile chemicals in groundwater during residential use.

Table C-3. Summary of Input parameters for Andelman model[a]

Exposure Scenario: Reasonable Maximum Exposure and Central Tendency for Child

Parameter Definition	Variable	Unit	RME Value	CT Value	Selection Basis	Comment
Groundwater concentration	C_w	mg/L	Site-specific	Site-specific	S	Based on site-specific sampling results and is the lower of either the maximum or the upper 95th percentile confidence limit on the mean.
Time of bathing	t_1	hr	0.45	0.14	SL	Values were recommended by U.S. EPA Region 2.
Time after bathing	t_2	hr	0.55	0.19	SL	Values were recommended by U.S. EPA Region 2.
Fraction of contaminant that is volatilized	f	unitless	0.9	0.5	D	Selected from the recommended range of 0.5–0.9 by Schaum et al. (1994).
Water flow rate into the shower	F_w	L/hr	1,000	500	D	Default range for this parameter is 500–1,000 L/hr by Schaum et al. (1994).
Bathroom volume	V_a	m^3	6	16	SL	Selected from the recommended range of 6–16 by Schaum et al. (1994).
Unit risk	UR	m^3/mg	Chemical-specific	Chemical-specific	D	The most updated value from IRIS, HEAST, or other sources will be used.
Reference concentration	RfC	mg/m^3	Chemical-specific	Chemical-specific	D	The most updated value from IRIS, HEAST, or other sources will be used.
Initial contaminant concentration in water	C_{wi}	mg/L	Chemical-specific	Chemical-specific	S	Based on site-specific sampling results and statistical analysis.
Average contaminant concentration in water	C_{wav}	mg/cm^3	Calculated	Calculated		Value will be calculated using C_{wi} and methodology by Schaum et al. (1994).
Exposure frequency	EF	days/year	350	350	D	
Exposure duration	ED	year	6	6	D	
Body weight	BW	kg	15	15	D	
Average time	AT	days	2,100 (non-cancer)	2,100 (non-cancer)	D	
			25,550 (cancer)	25,550 (cancer)	D	

Note: D - default
S - site- or chemical-specific
SL - selected from within the recommended range of parameter values

[a] As requested by NJDEP, the Andelman model (as modified by Schaum et al. 1994) will be used to estimate exposure to volatile chemicals in groundwater during residential use.

Table C-4. Showering exposure and risk characterization

Adult - Reasonable Maximum Exposure

Table C-4a. Calculations of Vapor Concentration In Shower Room for Chemicals of Concern

Chemical	C_w (mg/L)	t_1 (hr)	t_2 (hr)	f (unitless)	F_w (L/hr)	V_a (m^3)	C_{amax} (mg/m^3)	C_a (mg/m^3)
1,2-Dichloroethene isomers	1.20E-02	0.25	0.33	0.9	1,000	6	4.50E-01	3.53E-01
1,4-Dichlorobenzene	4.00E-03	0.25	0.33	0.9	1,000	6	1.50E-01	1.18E-01
2-Methylnaphthalene	1.00E-03	0.25	0.33	0.9	1,000	6	3.75E-02	2.94E-02
4-Methyl-2-pentanone	9.40E-03	0.25	0.33	0.9	1,000	6	3.53E-01	2.77E-01
4-Methylphenol	1.30E-02	0.25	0.33	0.9	1,000	6	4.88E-01	3.82E-01
Acetone	1.00E-01	0.25	0.33	0.9	1,000	6	3.75E+00	2.94E+00
Benzene	1.90E-02	0.25	0.33	0.9	1,000	6	7.13E-01	5.59E-01
bis[2-ethylhexyl]phthalate	6.00E-03	0.25	0.33	0.9	1,000	6	2.25E-01	1.77E-01
Chlorobenzene	6.40E-03	0.25	0.33	0.9	1,000	6	2.40E-01	1.88E-01
Chloroethane	7.80E-03	0.25	0.33	0.9	1,000	6	2.93E-01	2.29E-01
Naphthalene	1.70E-02	0.25	0.33	0.9	1,000	6	6.38E-01	5.00E-01
Toluene	3.90E-02	0.25	0.33	0.9	1,000	6	1.46E+00	1.15E+00
Xylene isomers	5.80E-02	0.25	0.33	0.9	1,000	6	2.18E+00	1.71E+00

Note: Groundwater concentrations are based on EPCs for Group 4.

Table C-4b. Calculations of Cancer Risk and Hazard Index for Chemicals of Concern

Chemical	C_a (mg/m^3)	UR (m^3/mg)	RfC (mg/m^3)	t_1 (hr)	t_2 (hr)	ED (year)	*X* (unitless)	Risk	HI
1,2-Dichloroethene isomers	3.53E-01	NA	7.00E-02	0.25	0.33	30	NA	NA	0.122
1,4-Dichlorobenzene	1.18E-01	6.30E-03	8.00E-01	0.25	0.33	30	7.68E-06	7.68E-06	0.004
2-Methylnaphthalene	2.94E-02	NA	3.00E-03	0.25	0.33	30	NA	NA	0.237
4-Methyl-2-pentanone	2.77E-01	NA	8.00E-02	0.25	0.33	30	NA	NA	0.084
4-Methylphenol	3.82E-01	NA	NA	0.25	0.33	30	NA	NA	NA
Acetone	2.94E+00	NA	3.50E-01	0.25	0.33	30	NA	NA	0.203
Benzene	5.59E-01	7.80E-03	3.00E-03	0.25	0.33	30	4.52E-05	4.52E-05	4.503
bis[2-ethylhexyl]phthalate	1.77E-01	4.00E-03	7.70E-02	0.25	0.33	30	7.31E-06	7.31E-06	0.055
Chlorobenzene	1.88E-01	NA	6.00E-02	0.25	0.33	30	NA	NA	0.076
Chloroethane	2.29E-01	8.30E-04	1.00E+01	0.25	0.33	30	1.97E-06	1.97E-06	0.001
Naphthalene	5.00E-01	NA	3.00E-03	0.25	0.33	30	NA	NA	4.029
Toluene	1.15E+00	NA	4.00E-01	0.25	0.33	30	NA	NA	0.069
Xylene isomers	1.71E+00	NA	1.00E-01	0.25	0.33	30	NA	NA	0.412
							Totals:	**6.21E-05**	**9.8**

Note: UR and RfC are from U.S. EPA (2003a) or (2003b).

Table C-5. Showering exposure and risk characterization

Adult - Central Tendency

Table C-5a. Calculations of Vapor Concentration in Shower Room for Chemicals of Concern

Chemical	C_w (mg/L)	t_1 (hr)	t_2 (hr)	f (unitless)	F_w (L/hr)	V_a (m^3)	C_{amax} (mg/m^3)	C_a (mg/m^3)
1,2-Dichloroethene isomers	1.20E-02	0.1	0.15	0.5	500	16	1.88E-02	1.50E-02
1,4-Dichlorobenzene	4.00E-03	0.1	0.15	0.5	500	16	6.25E-03	5.00E-03
2-Methylnaphthalene	1.00E-03	0.1	0.15	0.5	500	16	1.56E-03	1.25E-03
4-Methyl-2-pentanone	9.40E-03	0.1	0.15	0.5	500	16	1.47E-02	1.18E-02
4-Methylphenol	1.30E-02	0.1	0.15	0.5	500	16	2.03E-02	1.63E-02
Acetone	1.00E-01	0.1	0.15	0.5	500	16	1.56E-01	1.25E-01
Benzene	1.90E-02	0.1	0.15	0.5	500	16	2.97E-02	2.38E-02
bis[2-ethylhexyl]phthalate	6.00E-03	0.1	0.15	0.5	500	16	9.38E-03	7.50E-03
Chlorobenzene	6.40E-03	0.1	0.15	0.5	500	16	1.00E-02	8.00E-03
Chloroethane	7.80E-03	0.1	0.15	0.5	500	16	1.22E-02	9.75E-03
Naphthalene	1.70E-02	0.1	0.15	0.5	500	16	2.66E-02	2.13E-02
Toluene	3.90E-02	0.1	0.15	0.5	500	16	6.09E-02	4.88E-02
Xylene isomers	5.80E-02	0.1	0.15	0.5	500	16	9.06E-02	7.25E-02

Note: Groundwater concentrations are based on EPCs for Group 4.

Table C-5b. Calculations of Cancer Risk and Hazard Index for Chemicals of Concern

Chemical	C_a (mg/m^3)	UR (m^3/mg)	RfC (mg/m^3)	t_1 (hr)	t_2 (hr)	ED (year)	X (unitless)	Risk	HI
1,2-Dichloroethene isomers	1.50E-02	NA	7.00E-02	0.1	0.15	9	NA	NA	0.002
1,4-Dichlorobenzene	5.00E-03	6.30E-03	8.00E-01	0.1	0.15	9	4.22E-08	4.22E-08	0.000
2-Methylnaphthalene	1.25E-03	NA	3.00E-03	0.1	0.15	9	NA	NA	0.004
4-Methyl-2-pentanone	1.18E-02	NA	8.00E-02	0.1	0.15	9	NA	NA	0.002
4-Methylphenol	1.63E-02	NA	NA	0.1	0.15	9	NA	NA	NA
Acetone	1.25E-01	NA	3.50E-01	0.1	0.15	9	NA	NA	0.004
Benzene	2.38E-02	7.80E-03	3.00E-03	0.1	0.15	9	2.48E-07	2.48E-07	0.082
bis[2-ethylhexyl]phthalate	7.50E-03	4.00E-03	7.70E-02	0.1	0.15	9	4.02E-08	4.02E-08	0.001
Chlorobenzene	8.00E-03	NA	6.00E-02	0.1	0.15	9	NA	NA	0.001
Chloroethane	9.75E-03	8.30E-04	1.00E+01	0.1	0.15	9	1.08E-08	1.08E-08	0.000
Naphthalene	2.13E-02	NA	3.00E-03	0.1	0.15	9	NA	NA	0.074
Toluene	4.88E-02	NA	4.00E-01	0.1	0.15	9	NA	NA	0.001
Xylene isomers	7.25E-02	NA	1.00E-01	0.1	0.15	9	NA	NA	0.008
							Totals:	**3.41E-07**	**0.18**

Note: UR and RfC are from U.S. EPA (2003a) or (2003b).

Table C-6. Bathing exposure and risk characterization

Child - Reasonable Maximum Exposure

Table C-6a. Calculations of Vapor Concentration in Bathroom for Chemicals of Concern

Chemical	C_w (mg/L)	t_1 (hr)	t_2 (hr)	f (unitless)	F_w (L/hr)	V_a (m^3)	C_{amax} (mg/m^3)	C_a (mg/m^3)
1,2-Dichloroethene isomers	1.20E-02	0.45	0.55	0.9	1,000	6	8.10E-01	6.28E-01
1,4-Dichlorobenzene	4.00E-03	0.45	0.55	0.9	1,000	6	2.70E-01	2.09E-01
2-Methylnaphthalene	1.00E-03	0.45	0.55	0.9	1,000	6	6.75E-02	5.23E-02
4-Methyl-2-pentanone	9.40E-03	0.45	0.55	0.9	1,000	6	6.35E-01	4.92E-01
4-Methylphenol	1.30E-02	0.45	0.55	0.9	1,000	6	8.78E-01	6.80E-01
Acetone	1.00E-01	0.45	0.55	0.9	1,000	6	6.75E+00	5.23E+00
Benzene	1.90E-02	0.45	0.55	0.9	1,000	6	1.28E+00	9.94E-01
bis[2-ethylhexyl]phthalate	6.00E-03	0.45	0.55	0.9	1,000	6	4.05E-01	3.14E-01
Chlorobenzene	6.40E-03	0.45	0.55	0.9	1,000	6	4.32E-01	3.35E-01
Chloroethane	7.80E-03	0.45	0.55	0.9	1,000	6	5.27E-01	4.08E-01
Naphthalene	1.70E-02	0.45	0.55	0.9	1,000	6	1.15E+00	8.89E-01
Toluene	3.90E-02	0.45	0.55	0.9	1,000	6	2.63E+00	2.04E+00
Xylene isomers	5.80E-02	0.45	0.55	0.9	1,000	6	3.92E+00	3.03E+00

Note: Groundwater concentrations are based on EPCs for Group 4.

Table C-6b. Calculations of Cancer Risk and Hazard Index for Chemicals of Concern

Chemical	C_a (mg/m^3)	UR (m^3/mg)	RfC (mg/m^3)	t_1 (hr)	t_2 (hr)	ED (year)	*X* (unitless)	Risk	HI
1,2-Dichloroethene isomers	6.28E-01	NA	7.00E-02	0.45	0.55	6	NA	NA	0.374
1,4-Dichlorobenzene	2.09E-01	6.30E-03	8.00E-01	0.45	0.55	6	4.71E-06	4.71E-06	0.011
2-Methylnaphthalene	5.23E-02	NA	3.00E-03	0.45	0.55	6	NA	NA	0.727
4-Methyl-2-pentanone	4.92E-01	NA	8.00E-02	0.45	0.55	6	NA	NA	0.256
4-Methylphenol	6.80E-01	NA	NA	0.45	0.55	6	NA	NA	NA
Acetone	5.23E+00	NA	3.50E-01	0.45	0.55	6	NA	NA	0.623
Benzene	9.94E-01	7.80E-03	3.00E-03	0.45	0.55	6	2.77E-05	2.77E-05	13.805
bis[2-ethylhexyl]phthalate	3.14E-01	4.00E-03	7.70E-02	0.45	0.55	6	4.48E-06	4.48E-06	0.170
Chlorobenzene	3.35E-01	NA	6.00E-02	0.45	0.55	6	NA	NA	0.233
Chloroethane	4.08E-01	8.30E-04	1.00E+01	0.45	0.55	6	1.21E-06	1.21E-06	0.002
Naphthalene	8.89E-01	NA	3.00E-03	0.45	0.55	6	NA	NA	12.352
Toluene	2.04E+00	NA	4.00E-01	0.45	0.55	6	NA	NA	0.213
Xylene isomers	3.03E+00	NA	1.00E-01	0.45	0.55	6	NA	NA	1.264
							Totals:	**3.81E-05**	**30.03**

Note: UR and RfC are from U.S. EPA (2003a) or (2003b).

Table C-7. Bathing exposure and risk characterization

Child - Central Tendency

Table C-7a. Calculations of Vapor Concentration in Bathroom for Chemicals of Concern

Chemical	C_w (mg/L)	t_1 (hr)	t_2 (hr)	f (unitless)	F_w (L/hr)	V_a (m^3)	C_{amax} (mg/m^3)	C_a (mg/m^3)
1,2-Dichloroethene isomers	1.20E-02	0.14	0.19	0.5	500	16	2.63E-02	2.07E-02
1,4-Dichlorobenzene	4.00E-03	0.45	0.19	0.5	500	16	2.81E-02	1.82E-02
2-Methylnaphthalene	1.00E-03	0.45	0.19	0.5	500	16	7.03E-03	4.56E-03
4-Methyl-2-pentanone	9.40E-03	0.45	0.19	0.5	500	16	6.61E-02	4.29E-02
4-Methylphenol	1.30E-02	0.45	0.19	0.5	500	16	9.14E-02	5.93E-02
Acetone	1.00E-01	0.45	0.19	0.5	500	16	7.03E-01	4.56E-01
Benzene	1.90E-02	0.45	0.19	0.5	500	16	1.34E-01	8.66E-02
bis[2-ethylhexyl]phthalate	6.00E-03	0.45	0.19	0.5	500	16	4.22E-02	2.74E-02
Chlorobenzene	6.40E-03	0.45	0.19	0.5	500	16	4.50E-02	2.92E-02
Chloroethane	7.80E-03	0.45	0.19	0.5	500	16	5.48E-02	3.56E-02
Naphthalene	1.70E-02	0.45	0.19	0.5	500	16	1.20E-01	7.75E-02
Toluene	3.90E-02	0.45	0.19	0.5	500	16	2.74E-01	1.78E-01
Xylene isomers	5.80E-02	0.45	0.19	0.5	500	16	4.08E-01	2.64E-01

Note: Groundwater concentrations are based on EPCs for Group 4.

Table C-7b. Calculations of Cancer Risk and Hazard Index for Chemicals of Concern

Chemical	C_a (mg/m^3)	UR (m^3/mg)	RfC (mg/m^3)	t_1 (hr)	t_2 (hr)	ED (year)	*X* (unitless)	Risk	HI
1,2-Dichloroethene isomers	2.07E-02	NA	7.00E-02	0.14	0.19	6	NA	NA	0.004
1,4-Dichlorobenzene	1.82E-02	6.30E-03	8.00E-01	0.45	0.19	6	2.63E-07	2.63E-07	0.001
2-Methylnaphthalene	4.56E-03	NA	3.00E-03	0.45	0.19	6	NA	NA	0.041
4-Methyl-2-pentanone	4.29E-02	NA	8.00E-02	0.45	0.19	6	NA	NA	0.014
4-Methylphenol	5.93E-02	NA	NA	0.45	0.19	6	NA	NA	NA
Acetone	4.56E-01	NA	3.50E-01	0.45	0.19	6	NA	NA	0.035
Benzene	8.66E-02	7.80E-03	6.00E-03	0.45	0.19	6	1.54E-06	1.54E-06	0.385
bis[2-ethylhexyl]phthalate	2.74E-02	4.00E-03	7.70E-02	0.45	0.19	6	2.50E-07	2.50E-07	0.009
Chlorobenzene	2.92E-02	NA	6.00E-02	0.45	0.19	6	NA	NA	0.013
Chloroethane	3.56E-02	8.30E-04	1.00E+01	0.45	0.19	6	6.75E-08	6.75E-08	0.000
Naphthalene	7.75E-02	NA	3.00E-03	0.45	0.19	6	NA	NA	0.689
Toluene	1.78E-01	NA	4.00E-01	0.45	0.19	6	NA	NA	0.012
Xylene isomers	2.64E-01	NA	7.00E-01	0.45	0.19	6	NA	NA	0.010
							Totals:	**2.12E-06**	**1.21**

Note: UR and RfC are from U.S. EPA (2003a) or (2003b).

Table C-8. Assumptions used in Johnson and Ettinger model

Parameter		Undeveloped Area Input	Developed Area Input	Units	Rationale
Soil Model					
Depth below grade to bottom of enclosed floor space	L_F	200	15	cm	Model default for basement (U) and slab (D) construction
Depth below grade to top of contamination	L_t	200	15	cm	Because the soil contamination begins at the surface, L_t in the soil model must be equal to L_F
Depth below grade to bottom of contamination	L_b	230	80	cm	Site specific averages calculated separately for the developed and undeveloped areas from 10/97 to 6/00 sampling periods
Thickness of soil stratum A	h_A	200	15	cm	Assume only one stratum (Stratum B and C equal 0)
Stratum A soil type		L	L		Loam (RI indicates mixed sand/silt/clay; loam is midrange for water content, porosity)
Soil dry bulk density	ρ_b^A	1.59	1.59	g/cm^3	Default from Table 5 of Model Guidance
Total soil porosity	n^A	0.399	0.399	cm^3/cm^3	Default from Table 5 of Model Guidance
Stratum A water-filled porosity	θ_w^A	0.148	0.148	cm^3/cm^3	Default from Table 5 of Model Guidance
Stratum A soil organic carbon	f_{oc}^A	0.002	0.002	unitless	Default from Table 5 of Model Guidance
Groundwater Model					
Depth below grade to bottom of enclosed floor space	L_F	200	15	cm	Model default for basement (U) and slab (D) construction
Depth below grade to water table	L_{wt}	230	80	cm	Site specific averages calculated separately for the developed and undeveloped areas from 10/97 to 6/00 sampling periods
Thickness of soil stratum A	h_A	230	80	cm	Assume only one stratum (Stratum B and C equal 0)
Soil stratum directly above water table		A	A		Assume only one stratum
Soil type directly above water table		L	L		Loam (RI indicates mixed sand/silt/clay; loam is midrange for water content, porosity)
Stratum A soil type		L	L		Loam (RI indicates mixed sand/silt/clay; loam is midrange for water content, porosity)
Soil dry bulk density	ρ_b^A	1.59	1.59	g/cm^3	default from Table 5 of Model Guidance
Total soil porosity	n^A	0.399	0.399	cm^3/cm^3	default from Table 5 of Model Guidance
Stratum A water-filled porosity	θ_w^A	0.148	0.148	cm^3/cm^3	default from Table 5 of Model Guidance

Note: All other input parameters are model defaults. Because model results for developed and undeveloped soil were similar, groundwater modeling was conducted for developed area only and exposure concentrations were conservatively applied to both developed and undeveloped area.

Table C-9. Assumptions regarding groundwater depth used in Johnson and Ettinger model

	Date									
	10/15/97	12/9/97	1/15/98	12/10/99	2/10/00	4/10/00	6/19/00	9/24/02	Mean	
Undeveloped Area Depth to Groundwater (ft)										
MW-1	8.89	8.51	7.90	8.18	8.41	8.23	8.23	8.95	8.3	
MW-1A	6.53	6.44	--	--	--	--	--	--	6.5	
MW-2	10.62	10.02	9.49	9.74	9.96	9.61	9.72	10.54	9.9	
MW-3	9.84	9.32	8.81	9.02	9.29	8.90	8.94	9.93	9.2	
MW-4	--	7.22	6.92	6.92	7.26	7.04	6.95	7.43	7.1	
MW-4A	8.72	9.09	--	--	--	--	--	--	8.9	
MW-5	9.18	8.50	8.09	8.25	8.45	8.28	8.22	8.89	8.4	
MW-6	11.98	11.34	10.88	11.07	11.20	10.98	10.95	11.36	11.2	
MW-7	5.65	4.45	3.85	3.66	4.16	4.02	3.90	5.31	4.2	
MW-12	5.44	5.42	4.87	4.65	5.19	5.16	5.04	5.58	5.1	
MW-14	--	--	--	5.30	5.56	5.33	5.45	6.15	5.4	
							Area Average (ft)		7.7	= 233 cm
Developed Area Depth to Groundwater (ft)										
MW-8	6.68	5.88	5.37	5.20	5.38	5.40	5.96	6.39	5.7	
MW-9	6.26	5.08	4.24	3.69	3.60	3.39	3.45	5.05	4.2	
MW-10	2.30	0.84	1.14	0.44	0.96	0.12	0.91	1.76	1.0	
MW-11	1.62	1.70	0.36	0.20		1.14	0.15	0.70	0.9	
MW-13	--	--	--	1.64	2.15	2.05	1.84	2.90	2.1	
MW-14	--	--	--	2.05	2.29	2.36	2.11	2.90	2.2	
							Area Average (ft)		2.7	= 82 cm

Note: -- - not measured

Table C-10. Johnson and Ettinger modeling results for Ventron/Velsicol OU1

Subsurface Soil to Indoor Air Pathway

	Undeveloped Subsurface Soil to Indoor Air			Developed Subsurface Soil to Indoor Air		
Chemical	Soil Concentration (μg/kg)	Indoor Air Concentration (μg/m^3)	Note	Soil Concentration (μg/kg)	Indoor Air Concentration (μg/m^3)	Note
Organics						
Acetone	--	--		--	--	
Benzene	--	--		2,800	1.28E+01	
bis[2-ethylhexyl]phthalate	--	--		--	--	
Chloroethane	--	--		--	--	
Chlorobenzene	--	--		--	--	
Carbazole	890	6.08E-05	A	--	--	
1,2-Dichloroethene, isomers	--	--		--	--	
1,4-Dichlorobenzene	--	--		--	--	
Ethylbenzene	--	--				
4-Methyl-2-pentanone	--	--		--	--	
4-Methylphenol	--	--		--	--	
Toluene	7,300	2.61E+01		--	--	
Xylenes	11,300	4.03E+01	B	--	--	
PAHs						
Benz[a]anthracene	2,308	1.45E-03	C	--	--	
Benzo[a]pyrene	1,900	1.19E-03	C	--	--	
Benzo[b]fluoranthene	2,500	1.57E-03		--	--	
Benzo[ghi]perylene	826	5.17E-04	C	--	--	
Benzo[k]fluoranthene	737	4.62E-04	C	--	--	
Dibenz[a,h]anthracene	263	1.65E-04	C	--	--	
Indeno[1,2,3-cd]pyrene	862	5.40E-04	C	--	--	
Naphthalene	845	3.02E+00		--	--	
2-methylnapthalene	450	1.15E+00		450	1.15E+00	E
PCBs	4,400	NA	D	360	NA	D
Aroclor® 1242	--	--		--	--	
Aroclor® 1248	--	--		--	--	
Aroclor® 1254	550	NA	D	--	--	
Aroclor® 1260	--	--		--	--	

Note: A - Physical- and chemical-specific parameters are not available in the new version of J-E model database; modeling result was generated using parameters in previous version.

B - Average of results for the m-, o-, and p-xylenes.

C - Physical- and chemical-specific parameters are not available in the new version of J-E model database; benzo[b]fluorathene was used as a surrogate.

D - Physical- and chemical-specific parameters are not available in the J-E model database.

E - Subsurface soil concentrations for 2-methylnapthalene in the developed area were evaluated based on data for the undeveloped area because of limited sampling data in developed area.

Table C-11. Johnson and Ettinger modeling results for Ventron/Velsicol OU1

Groundwater to Indoor Air Pathway

	Groundwater to Indoor Air		
Chemical	Water Concentration (μg/L)	Indoor Air Concentration (μg/m^3)	Note
Organics			
Acetone	53.46	3.65E-02	
Benzene	10	9.67E-02	
bis[2-ethylhexyl]phthalate	--	--	
Chloroethane	6.3	3.05E-01	
Chlorobenzene	8.1	4.22E-02	
Carbazole	--	--	
1,2-Dichloroethene, isomers	8.3	8.68E-02	A
1,4-Dichlorobenzene	4	1.31E-02	
Ethylbenzene	14.6	1.39E-01	
4-Methyl-2-pentanone	7.2	6.33E-03	
4-Methylphenol	9.4	NA	B
Toluene	270.9	2.75E+00	
Xylenes	37.1	3.15E-01	C
PAHs			
Benz[a]anthracene	--	--	
Benzo[a]pyrene	--	--	
Benzo[b]fluoranthene	--	--	
Benzo[ghi]perylene	--	--	
Benzo[k]fluoranthene	--	--	
Dibenz[a,h]anthracene	--	--	
Indeno[1,2,3-cd]pyrene	--	--	
Naphthalene	13	1.58E-02	
2-methylnapthalene	1	1.08E-03	
PCBs	--	--	
Aroclor® 1242	--	--	
Aroclor® 1248	--	--	
Aroclor® 1254	--	--	
Aroclor® 1260	--	--	

Note: A - Average of results for the cis- and trans- isomers.
B - Physical- and chemical-specific parameters are not available in the J-E model database.
C - Average of results for the m-, o-, and p-xylenes.